Sequim Branch Library Expansion and Renovation

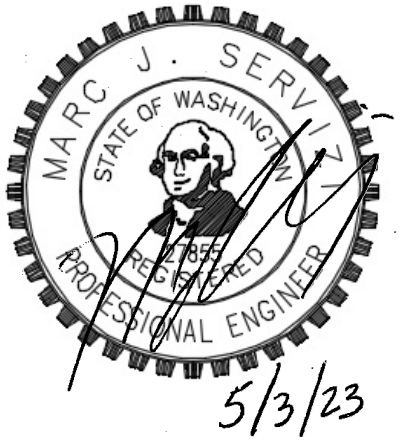
630 North Sequim Avenue

Sequim, WA 98382

Stormwater Site Plan

May 3, 2023

The information contained in this report was prepared by and under the direct supervision of the undersigned:



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SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

STORMWATER SITE PLAN

TABLE OF CONTENTS

Section 1 – Project Overview 1
Section 2 – Minimum Requirements 1
Section 3 – Existing Conditions 3
Section 4 – Offsite Analysis 4
Section 5 – Permanent Stormwater Control Plan 5
Section 6 – Construction Stormwater Pollution Prevention Plan (SWPPP) 11

FIGURES

Figure 1: Vicinity Map
Figure 2: Existing Impervious Coverage
Figure 3: Soils Map
Figure 4: Downstream Drainage Map
Figure 5: Proposed Conditions

APPENDICES

Appendix A – Design Drawings

Appendix B – Design Calculations and Supporting Information

Appendix C – Construction Stormwater Pollution Prevention Plan (SWPPP)

Appendix D – Operations and Maintenance Manual

Appendix E – Geotechnical Report

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION
STORMWATER SITE PLAN
MAY 3, 2023

SECTION 1 – PROJECT OVERVIEW

This Stormwater Site Plan is for the expansion and renovation at the Sequim Branch Library addressed at 630 N Sequim Avenue in Sequim, Washington. The library property is located on one parcel (#033020220047) in Section 20, Township 30 North, Range 3 West. Refer to **Figure 1 – Vicinity Map** for the site location.

The proposed project involves the expansion of the existing library building. Other improvements include re-paving of the parking lot and the installation of gravel/paved walkways and landscape areas.

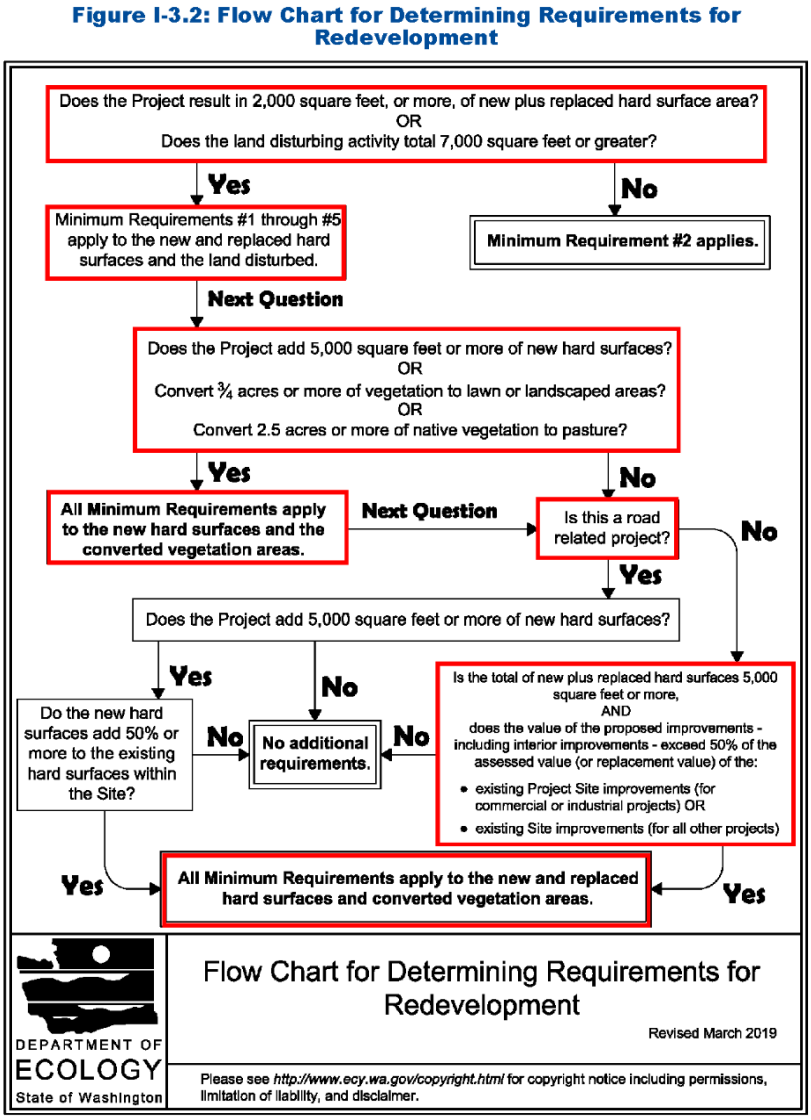
This Stormwater Site Plan addresses the requirements of the Department of Ecology (DOE) 2019 Stormwater Management Manual for Western Washington (SWMMWW) as adopted by the City of Sequim. This manual is herein referred to as the "2019 DOE Manual." Refer to the Minimum Requirements section of this report for the project classification and the minimum requirements that are applicable to the project area.

SECTION 2 – MINIMUM REQUIREMENTS

Per glossary of the 2019 DOE Manual, if the existing lot coverage is greater than 35% impervious, the project is classified as a **redevelopment**. The determination of existing impervious surface coverage for the entire library property was based upon an aerial image that was scaled and used in AutoCAD to delineate the existing impervious surfaces. The parking lot, walking paths, building roof areas, and all other paved hard surfaces were considered impervious. The existing impervious coverage for the entire site property is approximately 47.8%. Refer to **Figure 2 – Existing Impervious Coverage**. Therefore, this project is a considered a **redevelopment** and minimum requirements are dictated by Figure I-3.2 of the 2019 DOE Manual.

Based on the path prescribed by Figure I-3.2, there is greater than 5,000 square feet (SF) of new plus replaced hard surface involved with this project, and the valuation of the proposed improvements are expected to exceed 50% of the assessed value of the existing site improvements. Therefore, all minimum requirements (#1-9) apply to the **new plus replaced hard surfaces** and the **converted vegetation areas**.

Figure I-3.2 from the 2019 DOE Stormwater Management Manual



The following is a description of each of the minimum requirements and how this project addresses them:

Minimum Requirement #1 – Preparation of Stormwater Site Plans (MR1): This document is the Stormwater Site Plan. It outlines the existing and proposed site and drainage conditions, describes the flow control systems, and presents the stormwater management analysis.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan (SWPPP) (MR2): The construction SWPPP narrative is included in Appendix C of this report.

Minimum Requirement #3 – Source Control of Pollution (MR3): The project shall adhere to the applicable (mandatory) operational source control BMPs, as listed by section 2.1 of Volume IV of the 2019 DOE Manual. Other operational and structural source controls that must be adhered to per Chapter 2 of Volume IV are S411 (Landscaping and Lawn/Vegetation Management) and S417 (Maintenance of Stormwater Drainage and Treatment Systems). These structural source controls will be included in the SWPPP narrative in Appendix C.

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls (MR4): The existing drainage from the site generally sheet flows and infiltrates. Parts of the site, including the existing building, are routed to drywells for infiltration. The existing natural drainage path will be maintained in the proposed conditions, with topography bringing drainage from west to east. Proposed storm pipe systems will convey stormwater to an infiltrating bioretention east of the library building. See the Offsite Analysis section of this report for further explanation.

Minimum Requirement #5 – On-Site Stormwater Management (MR5): This project is subject to on-site stormwater management per section I-3.4.5 of the 2019 DOE Manual. This project will meet the LID Performance Standard through use of proposed infiltrating bioretention. Please see the On-Site Stormwater Management sub-section in Section 5 of this report for more information.

Minimum Requirement #6 – Runoff Treatment (MR6): Water quality treatment is required, as there is more than 5,000 square feet of pollution-generating hard surface (PGHS). Enhanced water quality treatment will be provided by the proposed infiltrating bioretention cell. See the Water Quality sub-section in Section 5 of this report for more information.

Minimum Requirement #7 **– Flow Control (MR7):** Flow control is required because the project proposes more than 10,000 SF of effective impervious within a threshold discharge area. Flow control applies to the **new plus replaced hard surfaces** and **converted vegetation areas**. The Flow Control Performance Standard applies, which includes matching the developed discharge durations from the target surfaces to the predeveloped (forested) durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. Refer to Section 5 of this report for more information on the design. The infiltrating bioretention cell is proposed to meet flow control requirements.

Minimum Requirement #8 – Wetlands Protection (MR8): There are no wetlands on-site or in close proximity to the site.

Minimum Requirement #9 – Operations and Maintenance (MR9): An Operations and Maintenance Manual for the associated proposed stormwater facilities is included in Appendix D of this report.

SECTION 3 – EXISTING CONDITIONS

Within the project area is a paved western parking area, library building and eastern grass field. Between the library building and grass field is a gravel drive and several outbuildings. There is a church bordering most of the northern side of the project area. N Sequim Ave runs parallel to the western side. The remaining northern, eastern, and southern sides of the project area are bordered by fields and pastures. There is site access from N Sequim Ave into the paved parking area and

from the bordering church parking lot into the gravel drive on the eastern side of the main library building.

Topographically, the overall grade slopes from west to east starting at an elevation of 162' at N Sequim Ave in the south western corner to 154.5' in the field at the north eastern corner. The slope across the site is approximately 1% with a steeper landscaping area on the northern and western edges of the library building that has a 2.0% slope.

According to the City of Sequim Stormwater and Surface Water Master Plan, the project is located within the Gierin Creek Drainage Basin which flows into the Strait of Juan de Fuca. A municipal stormwater drainage system exists along N Sequim Ave. Drainage in this municipal system flows north and discharges to an open ditch which connects to the Gierin Creek Drainage Basin. However, the existing site does not connect to the existing municipal stormwater system. Drainage on the project site sheet flows east, away from N Sequim Ave, into one of three existing dry wells or dispersing and infiltrating into the neighboring fields. Refer to the Downstream Analysis Section of this report for a more detailed description of the downstream drainage path.

According to the Web Soil Survey by the USDA Natural Resources Conservation Service, the soils within the project area consist primarily of "Sequim Very Gravelly Sandy Loam", 0 to 1 percent slopes. A geotechnical report was prepared by Associated Earth Sciences, Inc., dated August 25, 2022 and is attached in Appendix E of this report. Five geotechnical borings were completed around the eastern and southern sides of the existing library building. The borings encountered a fill layer beginning at 0 feet and ranging from 3 to 5 feet below ground surface, consisting of brown, gravelly, silty, fine to medium sand. The soils observed below the fill layer were native alluvial soils consisting of gravelly sand and sandy gravel. No groundwater was encountered in any borings. Refer to **Figure 3 – Soils Map**.

SECTION 4 – OFFSITE ANALYSIS

Stormwater mapping/GIS provided by the City of Sequim, and site survey information were used for the offsite stormwater analysis for the site.

Task 1 – Define and Map Study Area

The project site was mapped by a topographical field survey. This field survey was provided to LPD Engineering for use in the design of the improvements. The survey was supplemented by City of Sequim maps and information.

Task 2 – Information Review

Refer to the preceding Existing Conditions section of this report.

Task 3 – Field Inspection

Refer to the Existing Conditions Section of this report for a detailed description of the existing project area, as well as the preceding Task 2.

Task 4 – Drainage System Description and Problem Descriptions

A downstream analysis was conducted utilizing existing record drawings, the City of Sequim Strom and Surface Water Master Plan and existing survey information. Drainage for the site is divided into several sections, including the northern and southern sections of the existing parking area, library building, and eastern field. All of the runoff from the site infiltrates into the soil. Refer to **Figure 4 – Downstream Drainage Map**.

Drainage for the northern side of the parking area, sheet flows northeast into a catch basin which connects to a dry well in the northeastern corner of the parking area. Drainage for the southern side of the parking area sheet flows southeast into a drywell in the southeastern corner of the parking area.

Drainage from the existing building flows into a dry well through a pipe in the southeastern corner of the building.

Drainage from the open field area, east of the existing building, sheet flows east, dispersing across the site and into the bordering fields where it infiltrates into the soil.

SECTION 5 – PERMANENT STORMWATER CONTROL PLAN

As mentioned previously, the project is required to address Minimum Requirements #7 – Flow Control for the target surfaces that include **new plus replaced hard surfaces** and **converted vegetated areas.** Converted vegetation areas were already mitigated for during initial development, and therefore there are not any converted vegetation areas to be considered in this project's stormwater modeling. Per definition in the 2019 DOE Manual, converted vegetation areas consist of "surfaces on a project site where native vegetation, pasture, scrub/shrub, or unmaintained non-native vegetation are converted to lawn or landscaped areas." The project does not propose any areas for which this condition applies. The Flow Control Performance Standard requires matching the developed discharge durations from the target surfaces to the predeveloped (forested) durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.

The following table lists the total new plus replaced hard surfaces associated with the project. See Table 1 below and **Figure 5 – Proposed Conditions** for tabulation and layout of the target hard surfaces associated with this project.

Table 1 – Target Surface

	Square Feet	Acres
Roof	4,934	0.113
Standard Pavement Walkways	6,693	0.154
Parking Lot / Driveway (PGHS)	18,273	0.419
Gravel Surfacing	1,705	0.039
Total New Plus Replaced Hard Surface (Target Hard Surface)	**31,605**	**0.726**

From Table 1, the total new plus replaced hard surface is 0.762 acres. As mentioned, there are no converted vegetation areas, and therefore just the new plus replaced hard surfaces are required to be mitigated by flow control facilities. Thus, this total is listed as the "target hard surface". For a detailed explanation on the areas entered into the flow control model, see the Flow Control Model section of this report.

Existing Site Hydrology

Refer to the offsite analysis section of this report, Task 4 above, for a detailed description of the existing drainage conditions.

Proposed Site Hydrology

In the proposed conditions, stormwater runoff will generally be collected with swale or catch basins, and routed via piped conveyance system to the proposed infiltrating bioretention cell to be located east of the new library building addition. The bioretention cell will have an emergency overflow spillway that would disperse onto the open grass area east of the project area (within the library parcel).

Flow Control System

The stormwater model will be conducted with MGS Flood, an approved continuous-modeling software by the DOE Manual. For the mitigated scenario (postdeveloped condition), the representation of areas within the stormwater model must represent the areas physically draining to the proposed infiltrating bioretention area. This includes the corresponding tributary impervious area and grass area, as will be in the proposed conditions.

There are some new plus replaced hard surfaces requiring mitigation that cannot be feasibly routed to detention. These surfaces bypass the flow control facility, but must still be mitigated because they are part of the overall target hard surface. Compensatory hard surfaces will be utilized, consisting of the grind/overlay portion of the parking lot, existing library building roof, and some paved equipment pads on west side of site. In the proposed parking spaces, there will be some areas where the existing asphalt will be grinded and overlayed with a new asphalt layer. Because these surfaces are not taken down to base course or native soils, they are not considered part of the new plus replaced hard surface, per the Glossary of the 2019 DOE Manual. However, these areas will still be collected and routed to the bioretention to compensate for the bypass new plus replaced hard surface. The amount of compensatory impervious area routed to flow control is 8,816 SF (0.202 acres), while the amount of bypass new plus replaced hard surface is 398 SF (0.009 acres). Due to this, there is an appropriate amount of compensatory hard surface routed to the proposed bioretention, and therefore a bypass basin is not needed in the stormwater model.

As previously ascertained, the new plus replaced hard surface (target hard surface) must be mitigated to historical conditions, which is forested. The target hard surface area (Table 1) is therefore entered as "forested" area into the predeveloped basin. Due to the compensatory hard surface being collected to detention, there is "extra" impervious area, which is modeled as predeveloped impervious because it is not required to be mitigated.

Some proposed and existing pervious areas will drain to proposed conveyance systems and be routed to flow control; these areas are not new plus hard surface nor converted vegetation areas, and can thus be counted as grass in the predeveloped basin.

See Figure 5 – Proposed Conditions for the visual representation of the detention basin. Please see the following Tables 2 and 3, which outline the modeled areas for input into MGS Flood.

Table 2 – Modeled Predeveloped Area

	Square Feet	Acres
Forested Area	31,605	0.726
Impervious	8,418	0.193
Grass Area	14,017	0.322
Total Predeveloped Area	**54,040**	**1.241**

Table 3 –Modeled Postdeveloped Area

	Square Feet	Acres
Impervious Area	40,023	0.919
Grass Area	14,017	0.322
Total Postdeveloped Area	**54,040**	**1.241**

Flow Control Model

In MGS Flood, the appropriate areas from Tables 2 and 3 were entered. See the following illustrations for the representation of the basins in the predeveloped and postdeveloped scenario.

For the bioretention cell, an infiltration rate of 10 inches per hour will be used. This is the preliminary design rate allowed by the geotechnical engineer. Further infiltration testing will be conducted to confirm this rate. Refer to correspondence from geotechnical engineer attached in Appendix E.

Illustration 1 – MGS Flood Predeveloped Scenario

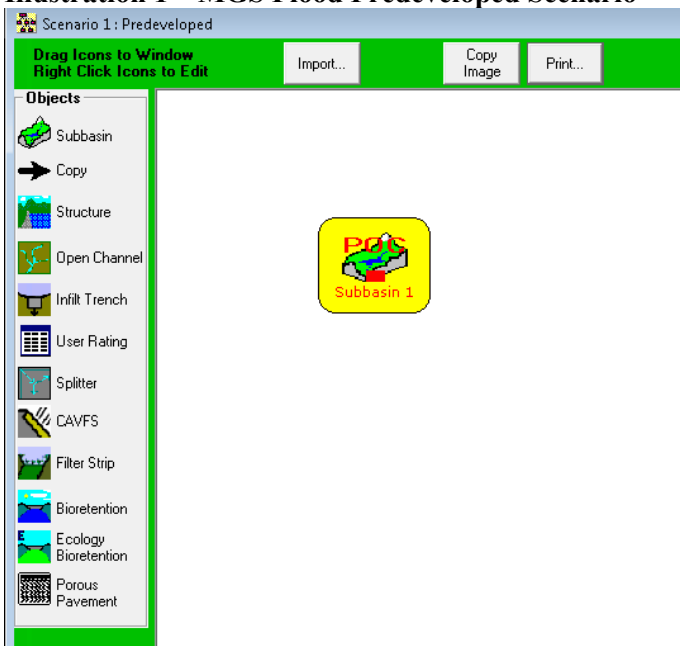
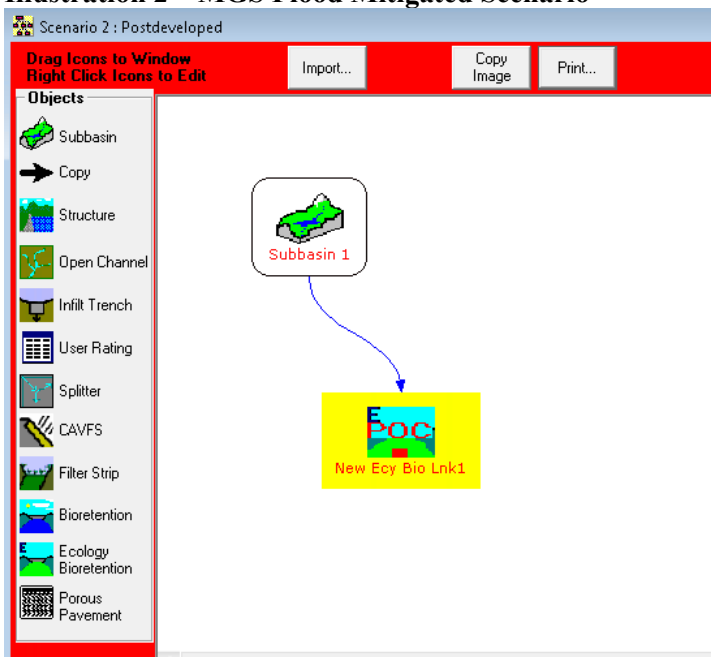


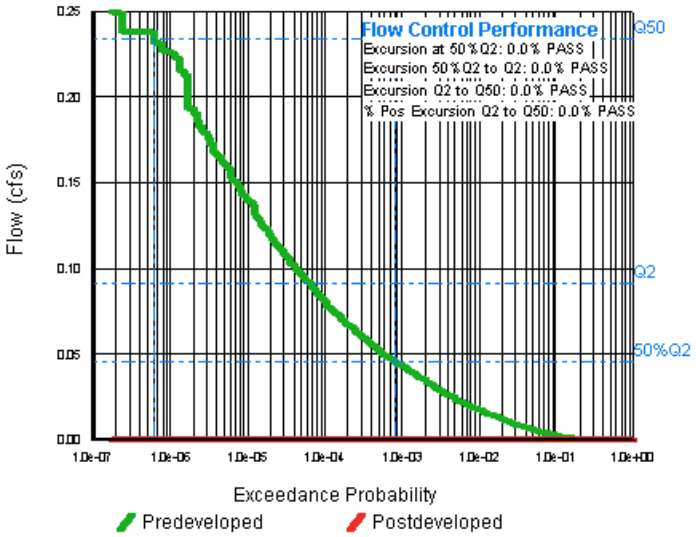
Illustration 2 – MGS Flood Mitigated Scenario



The proposed bioretention cell will have bottom surface area of 1,621 square feet with 6-inches of ponding and 3:1 side slopes. Refer to the complete MGS Flood output provided in Appendix B. The following graph (Graph 1) shows the flow duration plot from MGS Flood for the project. The bioretention cell proposed is in compliance with Minimum Requirement #7, which requires that stormwater discharges shall match developed discharge durations to predeveloped discharge

durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The system is designed to have zero outflow (full infiltration).

Graph 1 – Flow Duration Plot from MGS Flood



Water Quality Treatment

The project proposes greater than 5,000 SF of pollution-generating hard surface (PGHS), and therefore water quality treatment is required. The proposed infiltrating bioretention will provide enhanced water quality treatment. It is designed to infiltrate and treat 91% of the total runoff volume, as required by the DOE Manual.

The project does propose a small amount of PGHS at the driveway entrance (166 SF) to the parking lot that cannot be feasibly collected and routed to bioretention for treatment. However, a portion of the parking lot will just undergo grind/overlay, and thus does not count as new plus replaced hard surface. This PGHS area (2,507 SF) will still be collected and routed to bioretention for treatment, even though it is not required to be treated. Thus, this area will compensate for the proposed PGHS that will bypass the system.

Refer to the MGS Flood output report in Appendix B, showing that the bioretention mitigates 100% of the total runoff volume, providing adequate water quality treatment for the pollution-generating surfaces.

On-Site Stormwater Management

The project triggers minimum requirement #5, and therefore must provide on-site stormwater management. Per section I-3.4.5 of the 2019 DOE Manual, the project will meet the LID Performance Standard, which requires that "stormwater discharges shall match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow".

The proposed bioretention cell will meet the LID Performance Standard by utilizing infiltration of the native soils. The LID Performance Standard being met is shown in the MGS Flood output (Appendix B) and the preceding flow duration plot from MGS Flood.

Conveyance System Analysis and Design

A conveyance and backwater analysis of the onsite drainage was performed for 2 different pipe systems throughout the project site, all of which are inlet pipes to the infiltrating bioretention cell. The DOE Manual requires conveyance capacity for new systems to accommodate the 25-year peak storm. The peak flows from the tributary basin were determined using MGS Flood with 15-minute time steps. These values were compared to the full flow capacity of the conveyance pipes, which was determined using Manning's equation. The following systems were analyzed:

1. North System
2. South System

Refer to the conveyance and backwater analysis spreadsheet, attached in Appendix B. Each inlet pipe is an 8-inch diameter pipe (n=0.011 for PVC, n=0.012 for ductile iron) inlet pipe at slope of 0.5%, providing the full-flow pipe capacity listed on the spreadsheet. The MGS Flood reports showing the 25-year peak flow for each pipe run is in Appendix B. As a conservative measure, it was assumed the entire respective basin was tributary to each branch of pipe, which is not going to be the case with the upstream structures. Based on the results of the backwater analysis, it is not anticipated that there would not be any specific problems with flooding, as the headwater of the worst-case scenario (25-year storm) does not exceed the lowest catch basin rim elevation.

SECTION 6 – CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A construction SWPPP narrative for the project has been included in Appendix C and is based on Volume II of the 2019 DOE Surface Water Management Manual requirements. An NPDES permit from the Washington State Department of Ecology will be required for the project because it will disturb over one (1) acre of land area.

The TESC plan includes temporary sediment settling pond, utilizing the excavation for the proposed bioretention cell. A minimum volume was calculated using the methodology from the 2019 DOE manual, with the 2-year developed flow rate from MGS Flood. A copy of the Sediment Facility Sizing Calculations spreadsheet and associated MGS Flood output used for this exercise is attached in Appendix B. Stormwater runoff from the project work area will be directed toward temporary sumps installed as necessary. Stormwater will then be pumped to the temporary sediment settling pond.

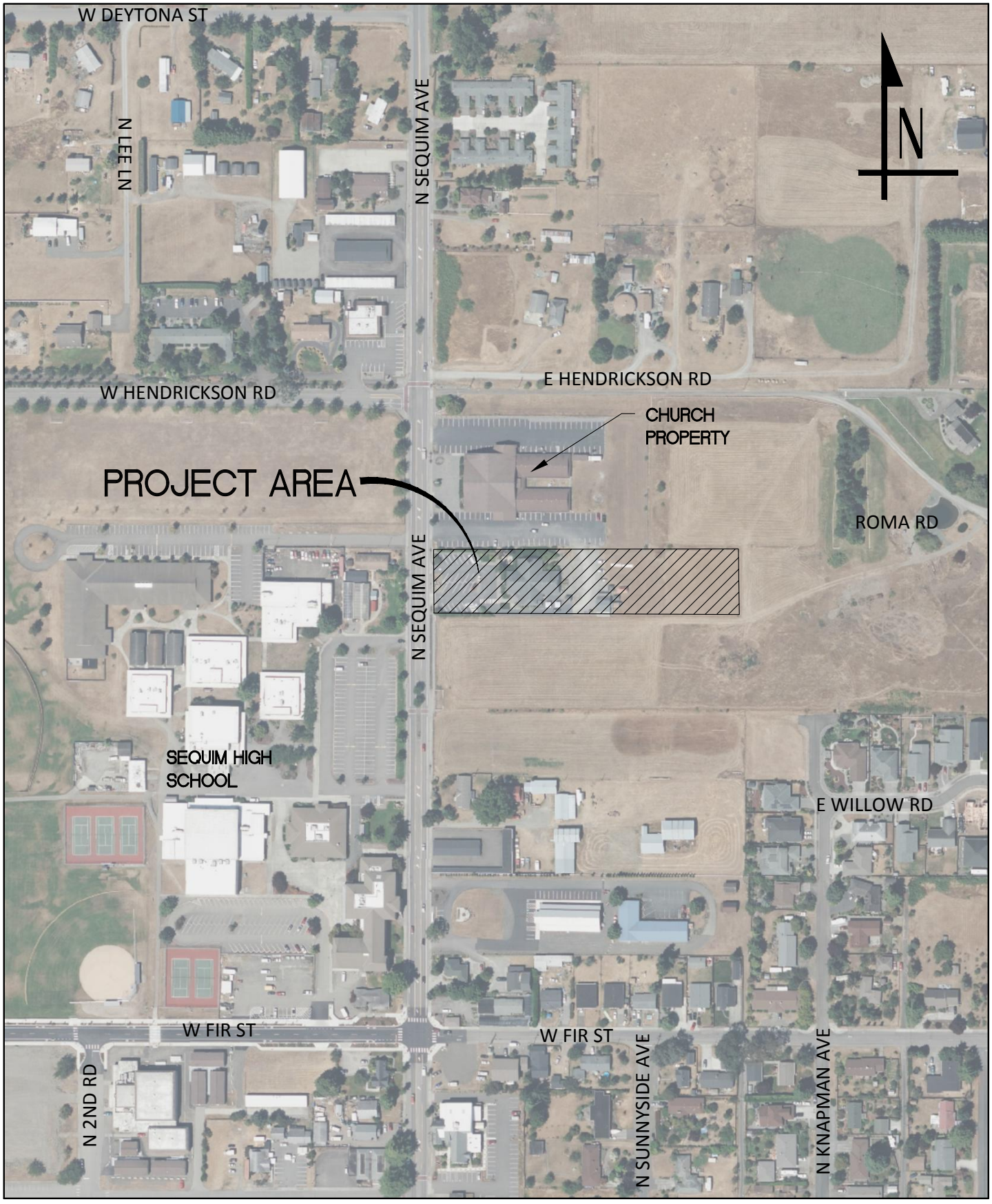
In addition to the sediment settling pond, TESC elements in the project include the following:

- Temporary Stabilized Construction Entrances, per BMP C105
- Storm Drain Inlet Protection, per BMP C220
- Silt Fence, per BMP C233

The TESC elements shown are intended to be the minimum allowable. The NPDES permit will require periodic inspection of the TESC elements to confirm they are holding up and continuing to function as intended. During construction, the contractor is responsible for upgrading these facilities as necessary. The implementation of the TESC plan and construction maintenance, replacement and upgrading of the TESC facilities are the responsibility of the contractor, per the contract documents. The TESC facilities will be constructed prior to and in conjunction with all clearing and grading activity and in a manner in which sediment or sediment laden water does not leave the project site, enter the drainage system, or violate applicable water quality standards.

FIGURES

Figure 1: Vicinity Map
Figure 2: Existing Impervious Coverage
Figure 3: Soils Map
Figure 4: Downstream Drainage Map
Figure 5: Proposed Conditions



SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

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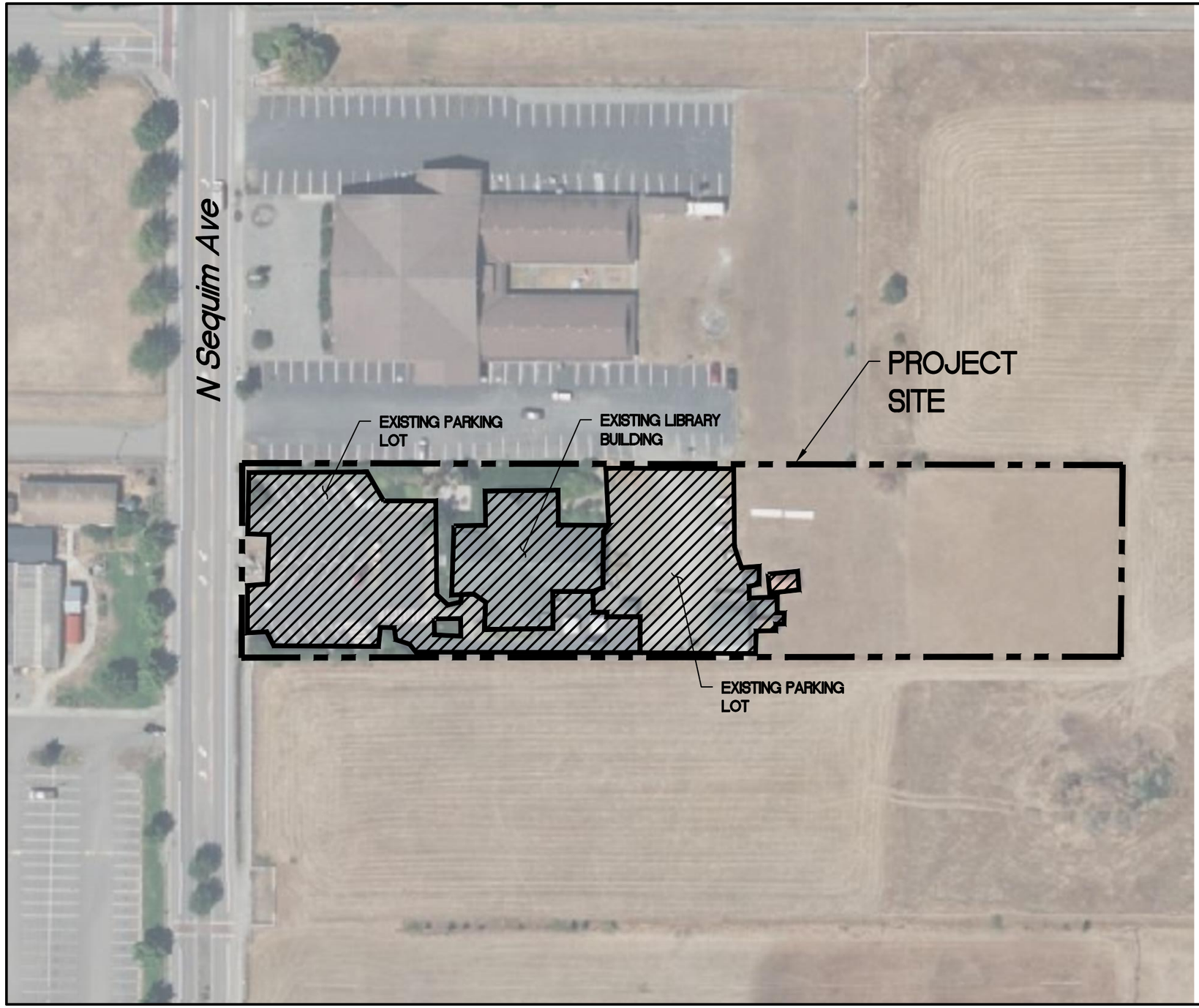
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VICINITY MAP

MAY 3, 2023

FIGURE

1



N

0 50 100

Scale 1"=100'

EXISTING IMPERVIOUS AREA	
Existing Impervious	0.92 AC
Total Property Area	1.92 AC
Percentage of Site Impervious	47.8%

s:\lpd engineering pllc\projects\shks\sequim library\drainage\tir exhibits\figure 2 - existing impervious coverage.dwg andreww 5/1/2023 5:18 PM

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

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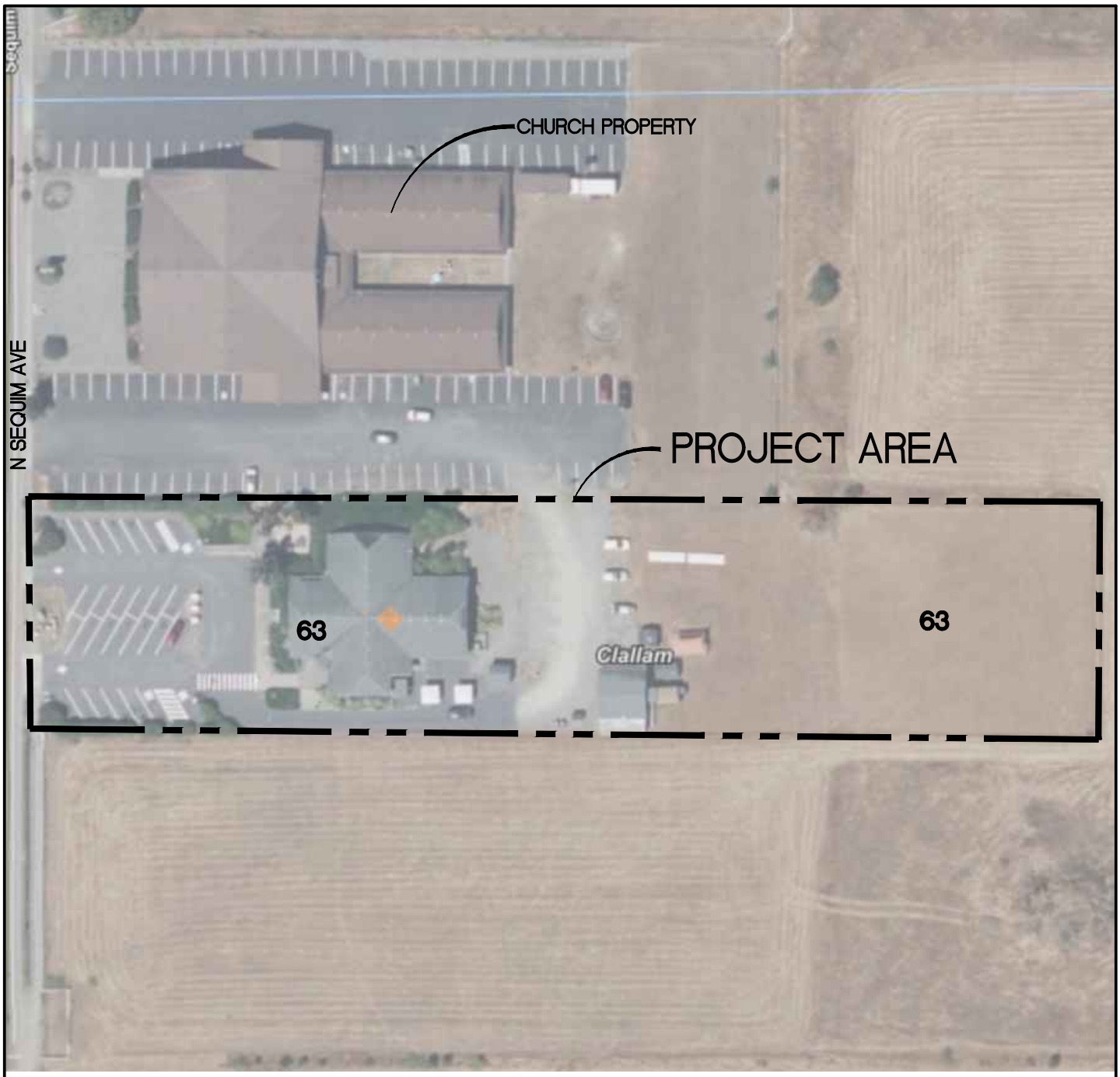
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DESCRIPTION

EXISTING IMPERVIOUS COVERAGE

MAY 3, 2023

FIGURE 2



N

CLALLAM COUNTY AREA, WASHINGTON (WA673)

MAP UNIT SYMBOL	MAP UNIT NAME
63	Sequim Very Gravelly Sandy Loam, 0% to 1% slopes

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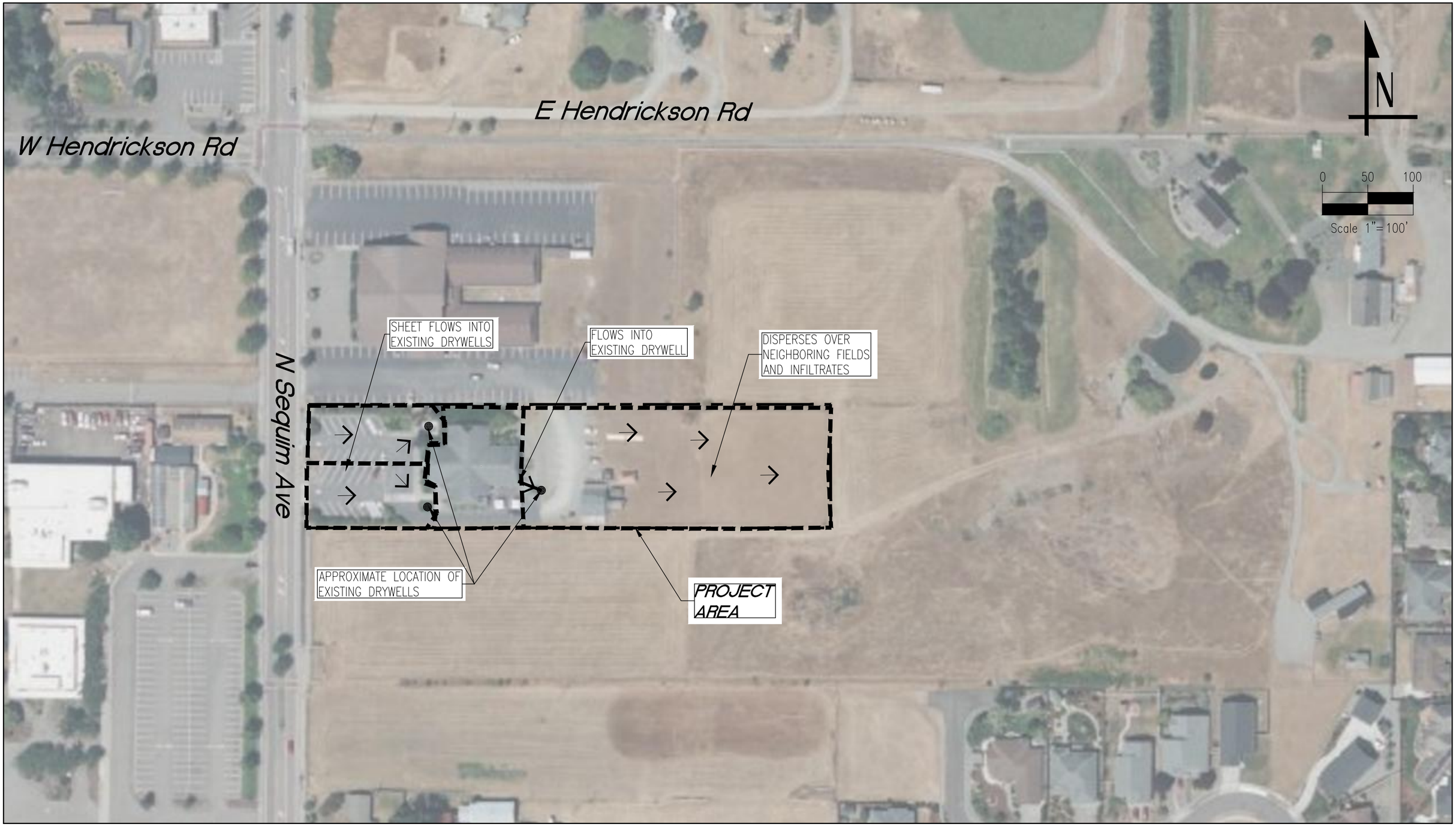
DESCRIPTION

SOILS MAP

MAY 3, 2023

FIGURE

3



SEQUIM BRANCH LIBRARY RENOVATION AND ADDITION

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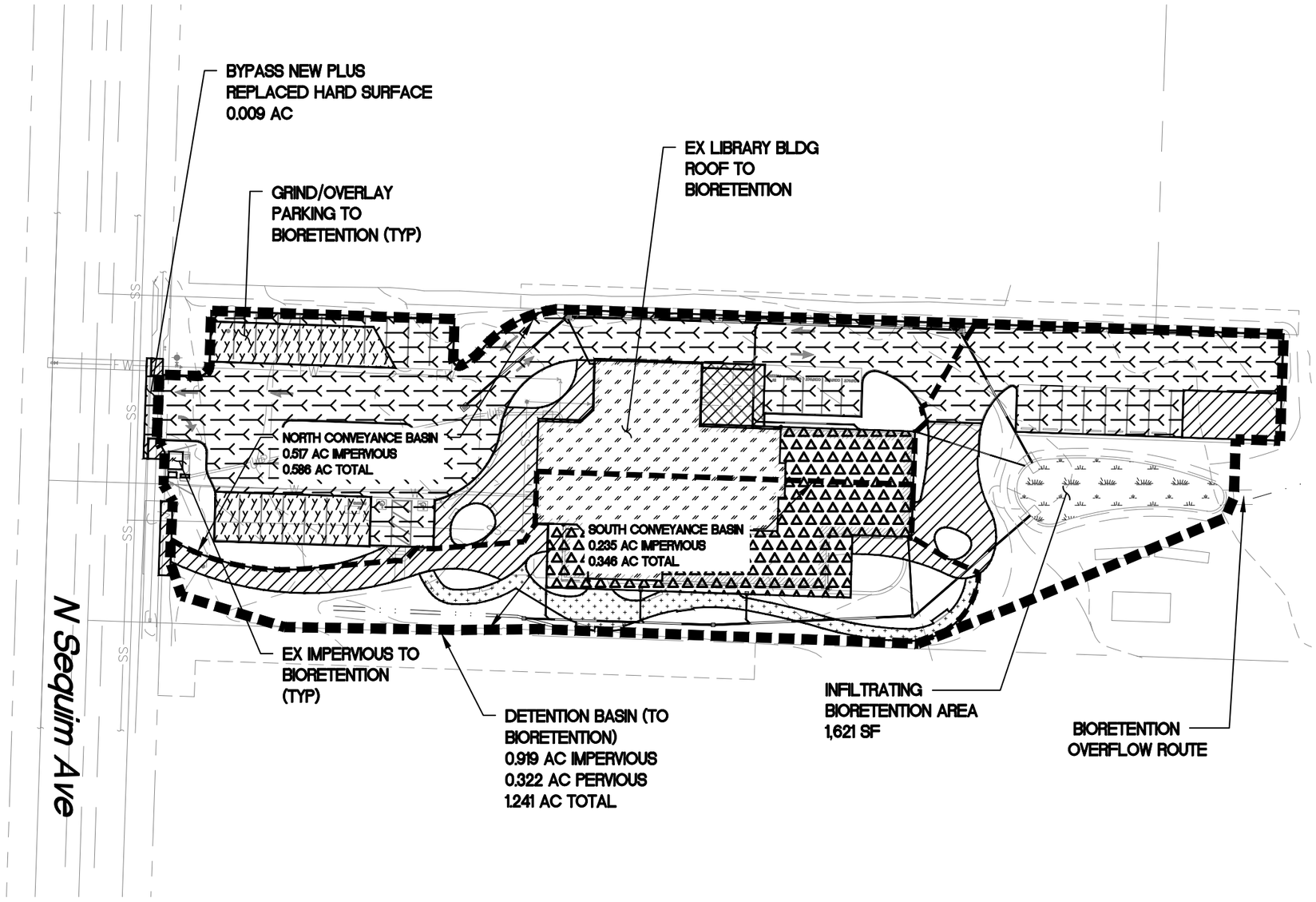
DESCRIPTION

DOWNSTREAM DRAINAGE MAP

MAY 3, 2023

FIGURE

4



N

0 25 50

Scale 1"=50'

Areas Summary

New Plus Replaced Hard Surfaces

	ROOF	4,934 SF (0.113 AC)
	STANDARD PAVEMENT WALKWAYS	6,693 SF (0.154 AC)
	PARKING LOT/DRIVEWAY (PGHS)	18,273 SF (0.418 AC)
	GRAVEL SURFACING	1,705 SF (0.039 AC)
	TOTAL NEW PLUS REPLACED HARD SURFACE (TARGET HARD SURFACE)	31,605 SF (0.726 AC)

	GRIND/OVERLAY PARKING TO BIORETENTION	2,507 SF (0.058 AC)
	EXISTING IMPERVIOUS TO BIORETENTION	6,309 SF (0.145 AC)

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

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DESCRIPTION

PROPOSED CONDITIONS

MAY 3, 2023

FIGURE 5

APPENDIX A

Design Drawings

NORTH OLYMPIC LIBRARY SYSTEM (NOLS)

SEQUIM BRANCH LIBRARY EXPANSION + RENOVATION
SEQUIM, CLALLAM COUNTY, WASHINGTON

GENERAL SUPPLEMENTAL CONDITIONS

INSPECTION: THE CITY AND INDEPENDENT MATERIAL TESTER SHALL HAVE FULL ACCESS TO THE SITE DURING CONSTRUCTION FOR THE PURPOSE OF INSPECTING AND TESTING TO VERIFY CONFORMANCE TO THE APPROVED SITE CONSTRUCTION PLANS, SPECIFICATIONS (CURRENT ADDITION OF WSDOT STANDARD SPECIFICATIONS), AND CITY STANDARDS. SITE INSPECTIONS WILL BE ONGOING THROUGH THE DURATION OF THE PROJECT. TESTING FREQUENCIES WILL BE AT A MINIMUM THE FREQUENCY INCLUDED IN THE SPECIFICATIONS.

G.I.S. MAPPING: THE DEVELOPER SHALL PROVIDE THE CITY WITH THE APPROVED SITE CONSTRUCTION DRAWINGS IN MODEL SPACE LAYOUT IN AUTOCAD FILE VERSION 14.0 OR HIGHER. THE FILE SHALL BE IN WASHINGTON STATE PLANE (NORTH ZONE) COORDINATE SYSTEM, NAD 83 DATUM, NAVD 88, IN U.S. FEET.

G.I.T. NON-CONFORMING WORK: NON-CONFORMING WORK IS ANY ELEMENT OF THE PROJECT NOT CONFORMING TO THE APPROVED SITE CONSTRUCTION PLANS, SPECIFICATIONS AND CITY STANDARDS. NOTICE OF NON-CONFORMING WORK WILL BE PROVIDED BY THE CITY TO THE DEVELOPER'S DESIGNATED REPRESENTATIVE WHO HAS THE AUTHORITY TO TAKE CORRECTIVE ACTION. FAILURE BY THE CITY TO IDENTIFY NON-CONFORMING WORK DOES NOT RELIEVE THE DEVELOPER OF THEIR OBLIGATION TO PERFORM THE WORK IN ACCORDANCE WITH THE APPROVED SITE CONSTRUCTION PLANS, SPECIFICATIONS, AND CITY STANDARDS.

QUALITY CONTROL HOLD POINTS: QUALITY CONTROL HOLD POINTS ARE POINTS IN THE SEQUENCE OF WORK AT WHICH TIME CITY INSPECTION OR TESTING IS REQUIRED BEFORE FURTHER WORK MAY PROCEED. A LIST OF QUALITY CONTROL HOLD POINTS WILL BE PROVIDED AT THE PRECONSTRUCTION MEETING.

MATERIAL APPROVAL: ALL MATERIALS TO BE PERMANENTLY INCORPORATED INTO THE PROJECT COMPONENTS THAT ARE TO BE DEDICATED TO THE CITY REQUIRE CITY APPROVAL. MATERIALS SUBMITTALS MUST BE SUBMITTED TO THE CITY USING THE WSDOT REQUEST FOR APPROVAL OF MATERIAL (RAM) FORM 350_071. MATERIAL APPROVAL AND ACCEPTANCE WILL BE DONE IN ACCORDANCE WITH THE WSDOT CONSTRUCTION MANUAL. THE CITY WILL HAVE 14 CALENDAR DAYS TO PROVIDE AN INITIAL SUBMITTAL RESPONSE. ADDITIONAL INFORMATION INCLUDING TESTING, CERTIFICATIONS, OR CATALOG CUTS MAY BE REQUIRED PRIOR TO A MATERIAL BEING APPROVED FOR USE. APPROVAL OF MATERIAL FOR USE DOES NOT CONSTITUTE MATERIAL ACCEPTANCE. MATERIAL ACCEPTANCE WILL BE CONTINGENT UPON COMPLETING THE ACCEPTANCE ACTION IDENTIFIED ON THE RAMS DURING CONSTRUCTION.

GENERAL NOTICE REQUIREMENT: THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 48 HOURS ADVANCE NOTICE FOR ANY INSPECTION, TESTING, OR UTILITY OPERATIONS WHERE CITY REPRESENTATIVE MUST BE PRESENT. NOTIFICATIONS SHALL BE GIVEN TO THE CITY REPRESENTATIVE DESIGNATED AT THE PRECONSTRUCTION MEETING. CITY MAINTENANCE CREWS WILL OPERATE ALL VALVES ASSOCIATED WITH THE MUNICIPAL WATER SYSTEM. AT NO TIME SHOULD THE CONTRACTOR OPERATE VALVES.

PROGRESS SCHEDULE: THE CONTRACTOR SHALL PROVIDE AN INITIAL SCHEDULE SHOWING THE SEQUENCE AND DURATION OF WORK ACTIVITIES FOR THE ENTIRE PROJECT. THE CONTRACTOR SHALL PROVIDE UPDATES TO THE SCHEDULE ON AN AS-NEEDED BASIS.

SURVEY: THE DEVELOPER (CONTRACTOR) IS RESPONSIBLE FOR PROVIDING CONSTRUCTION STAKING.

REQUEST FOR INFORMATION: ALL CONTRACTOR REQUESTS FOR INFORMATION SHALL BE DIRECTED TO THE DEVELOPER'S ENGINEER OF RECORD. THE DEVELOPER'S ENGINEER SHALL SEEK CITY CONCURRENCE TO RESPONSES RESULTING IN A CHANGE TO THE APPROVED SITE CONSTRUCTION PLANS AND SPECIFICATIONS BEFORE PROVIDING A RESPONSE TO THE CONTRACTOR. ALL RESPONSES SHALL BE PROVIDED TO THE CITY FOR INFORMATIONAL PURPOSES.

CHANGE ORDERS: ALL EQUITABLE ADJUSTMENTS IN TIME AND COSTS RESULTING FROM A CHANGE SHALL BE THE SOLE RESPONSIBILITY OF THE DEVELOPER. ALL CHANGE ORDERS RESULTING IN A CHANGE TO THE APPROVED SITE CONSTRUCTION PLANS AND SPECIFICATIONS MUST BE REVIEWED AND APPROVED BY THE CITY PRIOR TO INCORPORATION THE CHANGE.

RECORD DRAWINGS: UPON COMPLETION OF CONSTRUCTION AND PRIOR TO ACCEPTANCE, THE APPROVED CONSTRUCTION DRAWINGS SHALL BE CORRECTED TO REFLECT "AS-BUILT" CONDITIONS BY THE ENGINEER OF RECORD AND SHALL BE RETURNED TO THE CITY. THE RECORD DRAWING SUBMITTAL SHALL INCLUDE A PDF FILE ON DISK AND THE REQUIRED SIGNATURES. FOR DRAWINGS CREATED IN ELECTRONIC FORM, THE SUBMITTAL SHALL ALSO INCLUDE AN AUTOCAD FILE VERSION 14.0 OR HIGHER OF THE "AS-BUILT" DRAWINGS ON DISK.

CITY ACCEPTANCE: CITY ACCEPTANCE OF IMPROVEMENTS TO BE DEDICATED TO THE CITY SHALL BE IN ACCORDANCE WITH SEQUIM MUNICIPAL CODE CHAPTER 17.48.060 CITY ACCEPTANCE AND 17.64.010 COMPLETION – MAINTENANCE GUARANTEE.

ALTERATIONS: ANY ACCEPTED IMPROVEMENT IN CONFLICT WITH FUTURE INDIVIDUAL LOT DEVELOP (HOME CONSTRUCTION) INCLUDING BUT NOT LIMITED TO STREET TREES, STREET LIGHTING, FIRE HYDRANTS AND UTILITY STUB-OUTS, SHALL BE REPLACED PRIOR TO ISSUANCE OF THE FINAL OCCUPANCY CERTIFICATE. ANY IMPROVEMENT THAT DOES NOT MEET CITY STANDARD FOR ITS INTENDED PURPOSE DUE TO INDIVIDUAL LOT DEVELOPMENT INCLUDING BUT NOT LIMITED TO SIDEWALK AND CURB AND GUTTER SHALL BE REPLACED TO MEET THE CURRENT CITY STANDARD FOR THE INTENDED USE. THE COST OF SUCH ALTERNATIONS DESCRIBED ABOVE WILL NOT BE THE RESPONSIBILITY OF THE CITY.

DATUM

LEGAL DESCRIPTION

SEE INSTRUMENT RECORDED UNDER AUDITOR'S FILE NO. 529084, RECORDS OF CLALLAM COUNTY. WASHINGTON. SITUATE IN CLALLAM COUNTY, STATE OF WASHINGTON.

BASIS OF BEARINGS

WASHINGTON STATE COORDINATE SYSTEM, NORTH ZONE, (NAO 8.3/91), AS DETERMINED FROM DIRECT GNSS OBSERVATIONS TO MONUMENTS 0.3.301911 AND 0.3.3020.31 AS SHOWN ON SURVEY RECORDED IN VOL. .39 OF SURVEYS, PAGE 86, RECORDS OF CLALLAM COUNTY. WASHINGTON, UNDER AF# 1998-1010484. SEE AF#'S 1998-1010485 FOR MONUMENT DESCRIPTIONS.

DISTANCES SHOWN HEREON ARE REDUCED TO SAID GRID BY A COMBINED SCALE FACTOR OF 0.9999.381.3.

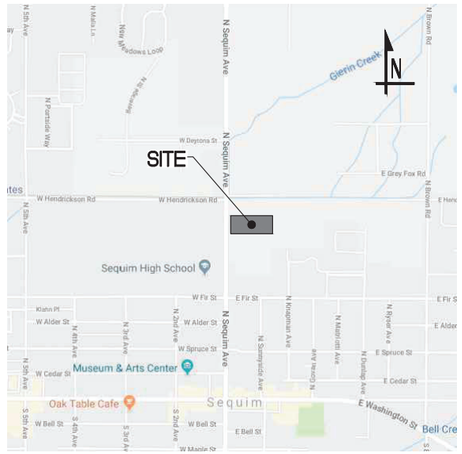
VERTICAL DATUM:
NAVO 88, BASED ON TIES TO THE ABOVE SITED MONUMENTS.
CONTOUR INTERVAL = 1.0 FEET

NOTES:

1. THE SURVEYED PARCEL MAY BE SUBJECT TO EASEMENTS OR OTHER ENCUMBRANCES EITHER RECORDED OR UNRECORDED NOT SHOWN HEREON. THIS SURVEY HAS NOT DETERMINED THE EXISTENCE OF ALL SUCH EASEMENTS OR ENCUMBRANCES OR THEIR EFFECT ON THE SURVEYED PARCEL, EXCEPT AS SPECIFICALLY SHOWN HEREON.
2. THIS TOPOGRAPHIC SURVEY MAY DEPICT EXISTING FENCE LINES OR OTHER OCCUPATIONAL INDICATORS THAT MAY INDICATE A POTENTIAL FOR CLAIMS OF UNWRITTEN TITLE. LEGAL OWNERSHIP BASED UPON UNWRITTEN TITLE CLAIMS HAVE NOT BEEN RESOLVED BY THIS SURVEY.
3. THIS SURVEY WAS PERFORMED ACCORDING TO W.A.C. 332-130-090 STANDARDS FOR LAND BOUNDARY SURVEYS. THIS SURVEY WAS NOT PERFORMED OR CERTIFIED TO MEET THE CURRENT "MINIMUM STANDARD DETAIL REQUIREMENTS" OR "ACCURACY STANDARDS" FOR ALTA/ACSM LAND TITLE SURVEYS. THEREFORE, USE OF THIS MAP FOR THE ISSUANCE OF AN ALTA/ACSM OWNER'S EXTENDED COVERAGE POLICY IS STRICTLY PROHIBITED.
4. THE PURPOSE OF THIS SURVEY IS FOR DESIGN AND PLANNING.
5. THE SOURCE OF CONTOUR INFORMATION IS FROM AERIAL FLIGHT PHOTOGRAMETRY CAMERA MODEL FC6J10_8.8_5472XJ648 AND IS COMPRISED OF 171 IMAGES WITH AN AVERAGE GROUND SAMPLING DISTANCE OF 0.04 FEET. THE PROCESSING WAS DONE ON PIX4D SOFTWARE WITH A MEDIAN OF 26,243 MATCHES PER CAL/BRA TED IMAGE. SIX GROUND CONTROL POINTS WERE UTILIZED AND NUMEROUS ADDITIONAL MEASUREMENTS USING GNSS PROCEDURES WERE MADE TO INSURE THE ACCURACY MEETS ONE-HALF THE CONTOUR INTERVAL STANDARDS.
6. UNDERGROUND UTILITIES LOCATIONS ARE SHOWN ON THIS SURVEY ARE A COMPILATION OF SURFACE FEATURES AND MARKINGS PROVIDED BY A UTILITY MARKING SERVICE.

SITE SUMMARY

AREA OF LOT	83,645 SF
LOT COVERAGE (EXISTING IMPERVIOUS AREA %)	47.91%
LOT COVERAGE (PROPOSED IMPERVIOUS AREA %)	46.06%
AREA OF LAND DISTURBING ACTIVITY	63,670 SF
BUILDING EXTERIOR	10,081 SF
HARD SURFACE (NEW & REPLACED)	31,605 SF



VICINITY MAP
SCALE: 1"=1000'

SHEET LIST

SHEET NO.	SHEET TITLE
C1.0	COVER
C1.1	NOTES AND SPECIFICATIONS
C1.2	TESC & DEMOLITION
C1.3	TESC DETAIL
C2.0	GRADING & DRAINAGE
C3.0	UTILITY & PAVING
C4.0	STRIPING & CHANNELIZATION
C5.0	DRAINAGE DETAILS
C5.1	PAVING & UTILITY DETAILS
C5.2	PAVING & UTILITY DETAILS
C5.3	PAVING DETAILS
1-2	TOPOGRAPHIC SURVEY

OWNER/APPLICANT
NORTH OLYMPIC LIBRARY SYSTEM

SURVEYOR
B.R. LYMANGROVER LAND SURVEYING
PORT ANGELES

ARCHITECT
SHKS ARCHITECTS
1050 N 38TH ST
SEATTLE, WA 98103
PHONE: (206) 675-9151

CIVIL ENGINEER
LPD ENGINEERING, PLLC
1932 FIRST AVE., SUITE 201
SEATTLE, WA 98101
PHONE: (206) 725-1211
CONTACT: MARC SERVIZI

CLALLAM COUNTY D.U.D. UTILITY DISTRICT #1
104 HOOKER ROAD
SEQUIM, WA 98382
PHONE: (360) 452-9771

CITY OF SEQUIM
WATER, SEWER, STORM
PUBLIC WORKS DEPT
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MARC J. SERVIZI — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
5/3/23

NOLS
SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION

630 N SEQUIM AVE
SEQUIM, WA 98382

Drawn by:	KES
Checked:	MJS
Date:	5/3/23
Scale:	As indicated

Revisions:

No.	Date	Remarks

PERMIT DOCUMENTS

COVER

C1.0

GENERAL

1. LOCATIONS SHOWN OF EXISTING UTILITIES AND IMPROVEMENTS ARE APPROXIMATE ONLY, AND IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXACT LOCATIONS OF ALL UTILITIES AND IMPROVEMENTS TO AVOID DAMAGE OR DISTURBANCE.

2a. ALL WORK AND MATERIALS MUST BE IN ACCORDANCE WITH THE LATEST REVISION, INCLUDING ADDENDA AND UPDATES, OF THE CITY OF SEQUIM DEVELOPER STANDARDS. CONTRACTOR TO KEEP A COPY OF THE CITY OF SEQUIM STANDARDS ON THE JOB SITE.

2b. CITY TO REVIEW AND APPROVE ALL MATERIALS PER WSDOT CONSTRUCTION MANUAL PROCEDURES. APPROVAL OF MATERIALS REQUIRED FROM CITY PRIOR TO ORDERING OF MATERIALS.

3. ROAD RESTORATION AND CONSTRUCTION SHALL BE PER APPLICABLE CITY OF SEQUIM / CLALLAM COUNTY / WSDOT STANDARDS.

4. UNDERGROUND UTILITIES ARE KNOWN TO EXIST IN THE AREA OF CONSTRUCTION. THE LOCATION OF EXISTING UTILITIES SHOWN IS APPROXIMATE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT ALL UTILITY OWNERS FOR LOCATIONS AND TO FIELD VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT UTILITY LOCATION SERVICE AT LEAST 48 HOURS PRIOR TO STARTING CONSTRUCTION AT 1-800-454-5555. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ALL EXISTING UTILITIES AND TO NOTIFY THE ENGINEER PROMPTLY OF ANY CONFLICT WITH EXISTING UTILITIES.

5. THE CONTRACTOR SHALL KEEP TWO SETS OF THESE APPROVED PLANS ONSITE AT ALL TIMES FOR RECORDING "AS BUILTS" INFORMATION. ONE SET SHALL BE SUBMITTED TO CITY OF SEQUIM AT COMPLETION OF CONSTRUCTION.

6. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT THE CITY OF SEQUIM FOR A PRECONSTRUCTION MEETING (MIN. 21 DAYS PRIOR TO STARTING WORK).

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH AND SAFETY OF THE PUBLIC, AND TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACTOR. ANY WORK WITHIN THE TRAVELED RIGHT-OF-WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE AT LEAST ONE FLAGGER FOR EACH LANE OF TRAFFIC AFFECTED. ALL SECTIONS OF THE WSDOT STANDARD SPECIFICATIONS 1-07.23 (PUBLIC CONVENIENCE AND SAFETY) SHALL APPLY.

8. THROUGHOUT THE WORK, THE CONTRACTOR SHALL COMPLY WITH ALL PERMITS.

9. THE CONTRACTOR SHALL LAY OUT AND SET ANY CONSTRUCTION STAKES AND MARKS NEEDED TO ESTABLISH THE LINES, GRADES, SLOPES OR CROSS-SECTIONS AS SHOWN ON THE PLANS OR AS STAKED BY THE ENGINEER.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EROSION CONTROL MEASURES THROUGHOUT THE DURATION OF THE PROJECT. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY CLEARING OR GRADING.

11. THE CONTRACTOR SHALL PROTECT ALL PRIVATE AND PUBLIC UTILITIES FROM DAMAGE RESULTING FROM THE WORK.

12. CONTRACTOR SHALL RESTORE ALL PRIVATE AND PUBLIC PROPERTY IN KIND THAT HAS BEEN DISRUPTED BY THE PROJECT IMMEDIATELY AFTER CONSTRUCTION.

13. ALL HARD SURFACED PAVEMENTS IN PUBLIC AREAS MUST BE REPAIRED AT THE CLOSE OF EACH WORK DAY. THE REPAIRS CAN BE TEMPORARY WITH ASPHALT COLD MID OR PERMANENT WITH H.M.A. ASPHALT. AT A MINIMUM, PERMANENT REPAIRS MUST REPAIR THE HARD SURFACE IN KIND.

14. INSPECTIONS FOR ROAD, DRAINAGE, AND UTILITY CONSTRUCTION SHALL BE AS OUTLINED AND IN ACCORDANCE WITH THE CITY STANDARDS.

BASES

1. ALL BASES AND BALLAST MAXIMUM FRACTION PASSING THE U.S. NO. 200 SIEVE SHALL NOT EXCEED 5%.
2. BALLAST, GRAVEL BASE, AND CRUSHED SURFACING SHALL BE COMPACTED TO MIN. 95% OF MAXIMUM DRY DENSITY.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COMPACTION TESTING.
4. ALL TRENCH BACKFILL BELOW THE STREET, SIDEWALK OR DRIVEWAYS SHALL BE BANK-RUN GRAVEL.

PAVEMENTS

1. A TACK COAT OF ASPHALT SHALL BE APPLIED BETWEEN ALL COURSES OF ASPHALT.
2. ALL PAVEMENT REPAIR SAW-CUT BEFORE REMOVAL. AR-4000W SHALL BE APPLIED TO ALL EDGES OF EXISTING PAVEMENT. ALL REPAIRS SHALL BE ACCORDING TO CITY STANDARDS.
3. ASPHALT CONCRETE PAVEMENT SHALL NOT BE PLACED NOR COMPACTED DURING HOURS OF DARKNESS.
4. SUBGRADE SHALL BE CERTIFIED IN WRITING BY THE GEOTECHNICAL ENGINEER PRIOR TO PAVING.
5. PAVEMENT SECTIONS SHALL BE REVIEWED BY THE OWNER AND GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION (SEE TYPICAL ROAD AND PAVEMENT SECTIONS).

UTILITIES

1. THE CONTRACTOR IS RESPONSIBLE FOR DOCUMENTATION OF ALL REQUIRED AS-BUILT DATA. THIS DATA MUST ACCURATELY REFLECT THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES, BOTTOM OF PIPE ELEVATIONS, INVERT ELEVATIONS, MANHOLE LOCATIONS, BLOW-OFF LOCATIONS AND INVERTS OF SERVICE CONNECTIONS. AS-BUILT DATA SHALL BE SUBMITTED TO THE ENGINEER WHO WILL PROVIDE CERTIFIED RECORD DRAWINGS TO PUBLIC WORKS UPON PROVISIONAL ACCEPTANCE OF ROAD AND UTILITY IMPROVEMENTS.
2. THE CONSTRUCTION OF UNDERGROUND UTILITY LINES SHALL BE SUBJECT TO THE FOLLOWING CRITERIA:
   A. NO MORE THAN 500 FEET OF TRENCH SHALL BE OPENED AT ONE TIME.
   B. WHERE CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS, EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
   C. TRENCH DEWATERING DEVICES SHALL DISCHARGE INTO THE TEMPORARY SEDIMENT POND.
   D. WHERE PRACTICAL, INSTALL GRAVITY PIPE UTILITIES PRIOR TO INSTALLATION OF OTHER UTILITIES.

EARTHWORK

1. THE CONTRACTOR SHALL CLEAR AND GRUB ALL VEGETATED AREAS WITHIN THE CLEARING LIMITS ON SHEET C-3.
2. THE CONTRACTOR SHALL RAZE, REMOVE AND DISPOSE OF ALL BUILDING AND FOUNDATIONS, STRUCTURES, FENCES AND OTHER OBSTRUCTIONS THAT LIE WHOLLY OR PARTIALLY WITHIN THE PROJECT LIMITS.
3. THE CONTRACTOR SHALL REMOVE AND REPLACE ALL EXISTING UNCOMPACTED OR POORLY COMPACTED FILL SOILS WITHIN THE PROPOSED PAVEMENT LIMITS, AT THE DIRECTION OF THE ENGINEER.
4. THE CONTRACTOR SHALL EXCAVATE AND GRADE TO THE ALIGNMENT, GRADE AND CROSS-SECTIONS SHOWN IN THE PLANS OR ESTABLISHED BY THE ENGINEER.
5. MAXIMUM DENSITY AND OPTIMUM MOISTURE FOR GRANULAR MATERIALS WILL BE DETERMINED USING ASTM D-1557 TEST METHOD.

STORM DRAINAGE

1. ALL PIPE AND APPURTENANCES SHALL BE LAID ON A PROPERTY PREPARED FOUNDATION IN ACCORDANCE WITH WSDOT 7-08.3(1). THIS SHALL INCLUDE LEVELING AND COMPACTING THE TRENCH BOTTOM, THE TOP OF THE FOUNDATION MATERIAL AND ANY REQUIRED PIPE BEDDING, TO A UNIFORM GRADE SO THAT THE ENTIRE PIPE IS SUPPORTED BY A UNIFORMLY DENSE UNYIELDING BASE. DRAINAGE MATERIALS SHALL CONFORM TO SEC. 9-05.
2. STORM SEWER PIPE SHALL BE CORRUGATED POLYETHYLENE PIPE (CPEP) UNLESS OTHERWISE NOTED AND SHALL CONFORM TO WSDOT STANDARD SPECIFICATIONS, SECTION 9-5.20.
3. ALL STORM SEWER PIPE SHALL HAVE A MINIMUM OF 2 FEET OF COVER.
4. ALL STORM SEWER PIPE SLOPES SHALL BE 2% OR GREATER UNLESS OTHERWISE SHOWN ON THE PLANS.

AMENDED SOIL (PER BMP T5.13)

(FOR DEVELOPED ON-SITE LANDSCAPE AREAS AROUND THE KITCHEN)

ALL LANDSCAPE AREAS SHALL USE TOPSOIL MIX WITH THE FOLLOWING CHARACTERISTICS (IN ACCORDANCE WITH BMP T5.13)

1. SOIL MIX SHALL HAVE MINIMUM ORGANIC MATTER CONTENT OF 10% BY DRY WEIGHT IN PLANTING BEDS (5% ORGANIC MATTER IN TURF AREAS, IF APPLICABLE).
2. pH BETWEEN 6.0 AND 8.0 OR A pH MATCHING THE PH OF THE UNDISTURBED SOIL.
3. TOPSOIL LAYER SHALL HAVE A MINIMUM DEPTH OF 8 INCHES EXCEPT WHERE THE TREE ROOTS LIMIT THE DEPTH OF THE INCORPORATION OF AMENDMENTS NEEDED TO MEET THE CRITERIA.
4. SUBSOILS BELOW THE TOPSOIL LAYER SHALL BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
5. MULCH PLANTING BEDS WITH 2 INCHES OF ORGANIC MATERIAL
6. USE COMPOST AND OTHER MATERIALS THAT MEET THE FOLLOWING ORGANIC CONTENT REQUIREMENTS:
   A. ORGANIC CONTENT FOR PRE-APPROVED AMENDMENT RATES CAN BE MET ONLY USING COMPOST THAT MEETS THE DEFINITION OF "COMPOSTED MATERIALS" IN WAC 173-350-100. THE COMPOST MUST ALSO HAVE AN ORGANIC MATERIAL CONTENT OF 40%-65%, AND A CARBON TO NITROGEN RATIO BELOW 25:1.
   B. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS MEETING (A) ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATION REQUIREMENTS AND MEETING THE CONTAINMENT STANDARDS OF GRADE A COMPOST.

EROSION/SEDIMENTATION CONTROL

1. THE IMPLEMENTATION OF THE TESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE TESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS APPROVED.
2. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
3. THE TESC FACILITIES SHOWN ON THE PLANS MUST BE CONSTRUCTED PRIOR TO ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER TO ENSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM OR VIOLATE APPLICABLE WATER QUALITY STANDARDS.
4. THE TESC FACILITIES SHOWN ON THE PLANS ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE TESC FACILITIES SHALL BE UPGRADED (E.G., ADDITIONAL SUMPS, RELOCATION OF DITCHES AND SILT FENCES, ETC.) AS NEEDED FOR UNEXPECTED STORM EVENTS.
5. THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
6. ANY AREA STRIPPED OF VEGETATION, INCLUDING ROADWAY EMBANKMENTS, WHERE NO FURTHER WORK IS ANTICIPATED FOR A PERIOD OF 7 DAYS, SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED TESC METHODS (E.G., SEEDING, MULCHING, NETTING, EROSION BLANKETS, ETC.).
7. THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A STORM EVENT.
8. AT NO TIME SHALL MORE THAN 6 INCHES OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
9. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
10. FROM APRIL 1 TO SEPTEMBER 30, SOIL SHALL BE EXPOSED FOR A MAXIMUM OF 7 DAYS. GROUND COVER BMPS SHALL BE USED TO STABILIZE THE SOIL. FOR AREAS THAT ARE AT FINISHED GRADE, THE GROUND WILL BE HYDROSEEDED WITH PERENNIAL GROUND COVER GRASS AND IMMEDIATELY COVERED WITH STRAW OR OTHER APPROVED MULCHING.
11. DURING THE TIME PERIOD OF OCTOBER 1 THROUGH MARCH 31, ALL PROJECT DISTURBED AREAS GREATER THAN 5,000 SQUARE FEET THAT ARE TO BE LEFT UNWORKED FOR MORE THAN 2 DAYS, SHALL BE COVERED BY ONE OF THE FOLLOWING COVER MEASURES: MULCH, SODDING OR PLASTIC COVERING.
12. PUBLIC RIGHTS OF WAY SHALL BE KEPT IN A CLEAN AND SERVICEABLE MANNER AT ALL TIMES. IN THE EVENT MATERIAL ARE INADVERTENTLY DEPOSITED ON ROADWAYS, THE MATERIAL SHALL BE PROMPTLY REMOVED. MATERIALS ARE TO BE SWEPT AND REMOVED PRIOR TO ANY FLUSHING. PUBLIC AND PRIVATE DRAINAGE WAYS SHALL BE PROTECTED FROM POLLUTION.
13. SOIL STOCKPILES SHALL BE STABILIZED WITHIN 24 HOURS, EXCEPT WHEN ACTIVELY WORKING WITH THE SOIL STOCKPILE. SILT FENCING SHALL BE INSTALLED AROUND ACTIVE SOIL STOCKPILES.
14. INLETS OF THE PERMANENT DRAINAGE SYSTEM SHALL BE PROTECTED FROM SEDIMENT INFLUX BY USE OF FILTER FABRIC, ROCK CHECK DAMS, AND SIMILAR FILTERING MATERIALS AND METHODS.
15. IMMEDIATELY FOLLOWING FINISH GRADING, PERMANENT VEGETATION (CONSISTING OF RAPID, PERSISTENT AND LEGUME) WILL BE APPLIED AT A MINIMUM 80# PER ACRE. THIS IS TO INCLUDE THE FOLLOWING: 20% ANNUAL, PERENNIAL OR HYBRID RYE GRASS, 40% CREEPING RED FESCUE, 40% WHITE CLOVER, OR AS OTHERWISE APPROVED BY THE CITY. HYDROSEED REQUIRED.
16. FERTILIZER SHALL BE APPLIED AT 400# PER ACRE OF 10-20-20 (10 POUNDS PER 11,000 SQUARE FEET) OR EQUIVALENT. DEVELOPMENTS ADJACENT TO WATER BODIES SHALL USE NON-PHOSPHORUS FERTILIZER.
17. FOR AREAS OVER 2:1 SLOPE THAT ARE NOT AT FINISHED GRADE, THE GROUND WILL BE COVERED BY CLEAR PLASTIC SHEETING (6 MIL). THE SHEETING WILL BE INSTALLED AND MAINTAINED TIGHTLY IN PLACE BY USING SAND BAGS OR TIRES ON ROPES AS REQUIRED.

WATER

1. CONSTRUCTING WATER MAINS 16 INCHES IN DIAMETER AND SMALLER MUST BE IN ACCORDANCE WITH THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DEVELOPED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION SPECIFICALLY SECTION 7-09 WATER MAINS. ANY DEVIATION FROM THESE STANDARD SPECIFICATION WILL BE CLEARLY NOTED IN THESE STANDARDS.
2. WATER MAIN PIPE MATERIAL MUST BE EITHER DUCTILE IRON CLASS 52 OR C900 PVC PRESSURE CLASS DR18 MINIMUM.
3. FOUNDATION MATERIAL MUST BE CLASS A: PER WSDOT STANDARD SPECIFICATIONS.
4. COMPACTION REQUIREMENTS: 95% PER ASTM D1557
5. TRACE WIRE INFORMATION: ALL TRACE WIRE TO BE 12 GAUGE STRANDED COPPER WIRE WITH BLUE PE INSULATION ON ALL WATER LINES & WITH UNDERGROUND SPLICE KITS ACCEPTABLE TO THE CITY.
6. METER PLACEMENT: METER SHALL BE INSTALLED IN A NON VEHICULAR TRAFFIC AREA SATISFACTORY TO THE CITY. IF THE METER MUST BE PLACED IN A VEHICULAR TRAFFIC AREA, THEN A H20 RATED LID MUST BE PROVIDED.
7. "OR EQUAL" MATERIALS ARE SUBJECT TO CITY APPROVAL.
8. ALL PIPES MUST BE NSF 61 COMPLIANT, ALL JOINTS AND FITTINGS MUST BE NSF 61 & 372 COMPLIANT.
9. ALL NEW CONNECTION 2" AND LARGER MUST HAVE A SHUTOFF VALVE; SEE FIGURE 5-04 FOR PLACEMENT.
10. ALL NEW WATER LINES MUST BE DISINFECTED PER ANSI/AWWA C651, INCLUDING BUT NOT LIMITED TO FIRE HYDRANT EXTENSIONS. SEE FIGURE 5-01.
11. ALL LINES MUST BE FLUSHED AFTER DISINFECTING PROCESS COMPLETE, AND A BACTERIOLOGICAL SAMPLE WILL BE COLLECTED BY THE CITY. SEE FIGURE 5-01.
12. ALL NEW LINES MUST BE PRESSURE TESTED. SEE FIGURE 5-01.
13. ONLY CITY REPRESENTATIVES ARE ALLOWED TO OPERATE EXISTING AND NEW TIE IN VALVES.
14. ALL TESTS MUST BE COMPLETED BEFORE CONNECTING TO THE EXISTING WATER MAIN, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
15. ALL VALVES LARGER THAN 2 INCHES SHALL BE RESILIENT SEAT GATE VALVES.
16. NO SERVICE CONNECTIONS SHALL BE MADE TO FIRE HYDRANT LINES UNLESS OTHERWISE APPROVED BY THE ENGINEER.

TESTING INFORMATION

GENERAL NOTES:

1. ALL TESTING MUST BE COMPLETED AND APPROVED BEFORE ANY CONNECTION TO THE WATER MAIN OCCURS, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. THE ONLY EXCEPTION TO THE PREVIOUS STATEMENT IS WHEN THE DISTANCE FROM THE EXISTING PIPE TO THE NEW VALVE IS 20 FEET OR LESS.
2. ALL TESTS SHALL BE COMPLETED WITH A CITY REPRESENTATIVE ONSITE.
3. ALL EQUIPMENT NEEDED IN ORDER TO COMPLETE THE TESTS SHALL BE FURNISHED AND OPERATED BY THE CONTRACTOR.
4. PRESSURE TESTING SHALL BE LIMITED TO 1000-1500 FEET OF CONTINUOUS PIPE OR BETWEEN VALVES WHICHEVER IS A SHORTER DISTANCE. THE FIRST 1000 FEET OF PIPE MUST BE SUCCESSFULLY TESTED BEFORE ANY ADDITIONAL PIPE MAY BE PLACED.
5. ALL GAUGES AND METERS SHALL BE APPROVED BY THE CITY REPRESENTATIVE.
6. ALL MATERIALS SHALL BE INSTALLED PER MANUFACTURES SPECIFICATIONS OR PER CITY ENGINEER APPROVAL.

DISINFECTION: CHLORINE SHALL BE APPLIED IN ONE OF THE FOLLOWING MANNERS, LISTED IN ORDER OF PREFERENCE, TO SECURE A CONCENTRATION IN THE PIPE OF AT LEAST 50 MG/L.

1. INJECTION OF CHLORINE-WATER MIXTURE FROM CHLORINATING APPARATUS THROUGH CORPORATION COCK AT BEGINNING OF SECTION AFTER PIPE HAS BEEN FILLED, AND WITH WATER EXHAUSTING AT END OF SECTION AT A RATE CONTROLLED TO PRODUCE THE DESIRED CHLORINE CONCENTRATION;
2. INJECTION SIMILARLY OF A HYPOCHLORITE SOLUTION;
3. PLACEMENT OF DRY CALCIUM HYPOCHLORITE THROUGHOUT PIPELINE, AS CONSTRUCTED, IN PROPER QUANTITIES TO PRODUCE THE DESIRED DOSAGE. FILLING OF PIPELINE WITH THIS METHOD SHOULD BE AT A VERY SLOW RATE. PIPELINE SHOULD BE FILLED WITHIN 2 DAYS OF PLACING STERILIZING AGENT
4. AFTER THE DESIRED CHLORINE CONCENTRATION HAS BEEN OBTAINED THROUGHOUT THE SECTION OF LINE, THE WATER IN THE LINE SHALL BE FILLED BY THE CITY AT THE REQUEST OF THE DEVELOPER AND LEFT STANDING FOR A PERIOD OF NO LESS THAN 24 HOURS.

PRESSURE TESTING/LEAKAGE TEST: PRESSURE TESTS SHALL BE COMPLETED IN CONJUNCTION WITH THE LEAKAGE TEST. ALL THRUST BLOCKS AND ANCHORS SHALL BE IN PLACE AND THE PIPE SHALL BE SECURED OR BURIED, BUT ALL CONNECTIONS MUST BE LEFT UNCOVERED FOR OBSERVATION. THE SYSTEM WILL THEN BE PUMPED UP TO 225 PSI FOR A TIME OF 30 MINUTES (ONCE IT REACHES PRESSURE). IF THERE IS AN ABRUPT DROP IN PRESSURE OR ANY VISIBLE LEAKS DISCOVERED IN THE 30 MINUTE PERIOD THE TEST WILL BE STOPPED AND THE ISSUE WILL BE RESOLVED. UPON COMPLETION OF THE 30 MINUTE PERIOD IF THERE ARE NO ABRUPT DROPS IN PRESSURE OR VISIBLE LEAKS, THE WATER LINE WILL BE PUMPED BACK UP TO 225 PSI THROUGH A POSITIVE DISPLACEMENT WATER METER. THE LEAKAGE TEST WILL BE DETERMINED BY THE AMOUNT OF WATER THAT IS REQUIRED TO PUMP THE WATER LINE BACK TO PRESSURE. THE AMOUNT OF WATER THAT LEAKED IN THE 30 MINUTE TIME FRAME MAY NOT EXCEED THE VALUE SPECIFIED IN THE TABLE BELOW. IF THE AMOUNT OF LEAKAGE EXCEEDS THE ALLOWABLE LEAKAGE, THE LEAK MUST BE LOCATED AND FIXED BEFORE A FOLLOW-UP TEST CAN BE COMPLETED.

ALLOWABLE LEAKAGE TABLE	
PIPE DIAM. (IN.)	GAL. PER 0.5 HOUR PER 100 FT@ 225 PSI
2	0.0056
4	0.0113
6	0.0169
8	0.0225
10	0.0282
12	0.0338
15	0.0422
18	0.0507

L=(SD√P)/266400
WHERE:
L = ALLOWABLE LEAKAGE, GALLONS/HOUR
D = NOMINAL DIAMETER OF THE PIPE IN INCHES
P = TEST PRESSURE DURING THE LEAKAGE TEST (PSI)
S = GROSS LENGTH OF PIPE TESTED, FEET

NOTE: EQUATION IS GAL/HOUR, DIVIDE BY 2 TO GET GAL/ HALF HOUR
MULTIPLY BY 10 TO GET PER 1000 FT DATA

DECHLORINATING: THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF DISINFECTING SOLUTION TO THE SATISFACTION OF THE CONTRACTING AGENCY AND LOCAL AUTHORITIES. AT A MINIMUM, CHLORINATED WATER SHALL BE DECHLORINATED TO A CONCENTRATION OF 0.1 PARTS PER MILLION (ppm) OR LESS, AND PH ADJUSTMENT TO WITHIN 6.5-8.5 STANDARD UNITS BEFORE DISCHARGING TO SURFACE WATERS OF THE STATE OR TO A STORM SEWER SYSTEM THAT DRAINS TO SURFACE WATERS OF THE STATE.

FLUSHING:. THE WATER MAINS SHALL BE FLUSHED AT A RATE TO PROVIDE A MINIMUM VELOCITY OF 2.5 FEET PER SECOND IN THE MAIN. ANY PERMANENT OR TEMPORARY TAP REQUIRED FOR RELEASE OF AIR, CHLORINATION, OR FLUSHING PURPOSES SHALL BE PROVIDED BY THE DEVELOPER.

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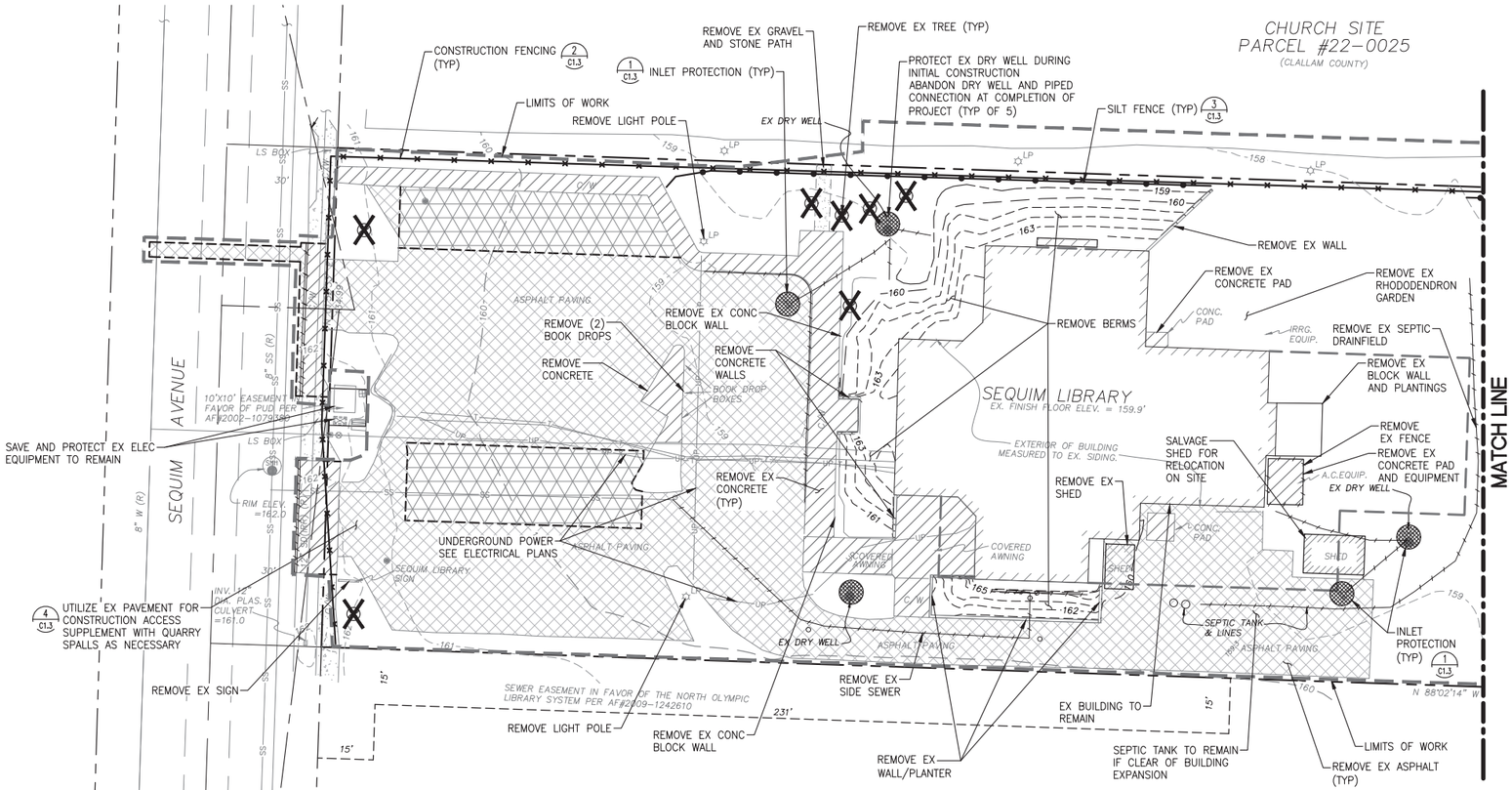
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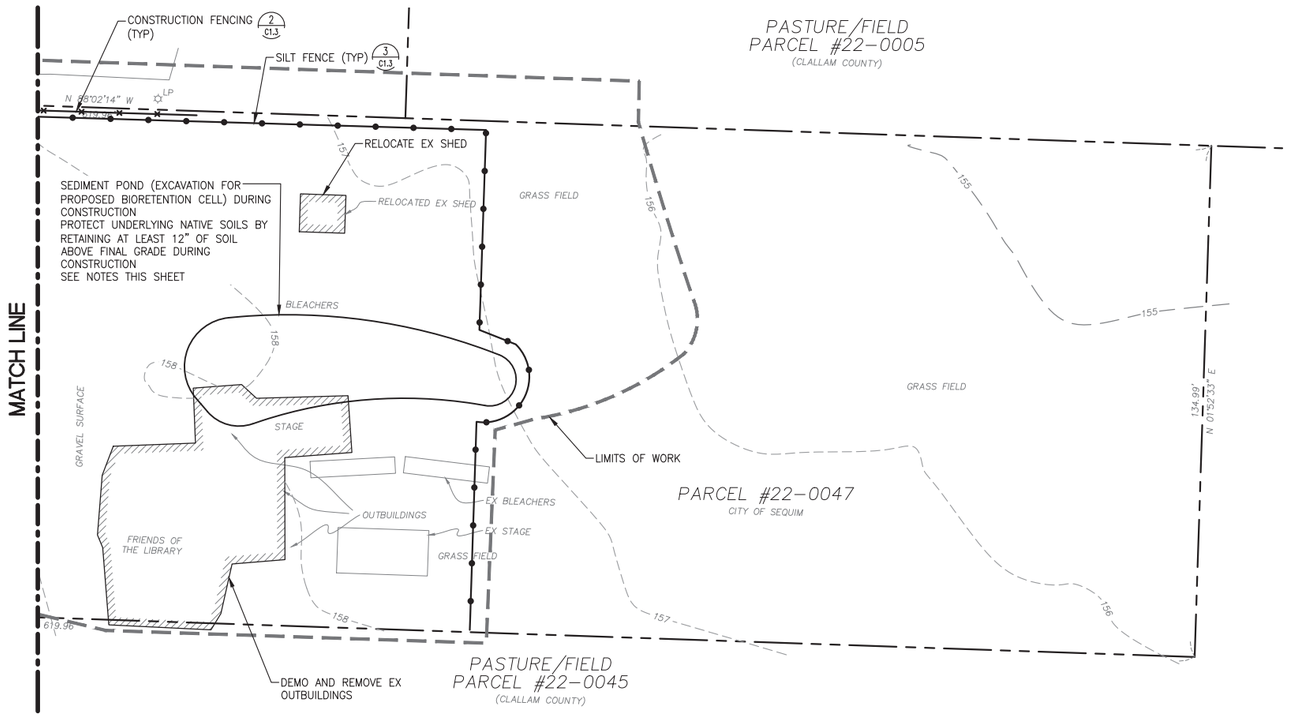
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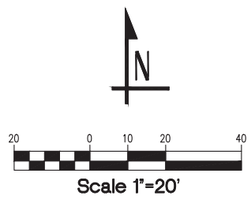
PERMIT DOCUMENTS

NOTES AND SPECIFICATIONS

C1.1







LEGEND

- PROPERTY LINE
- EX CONTOUR (INDEX)
- EX CONTOUR
- EX BUILDING
- BUILDING/STRUCTURE REMOVAL
- PROPOSED BUILDING OUTLINE
- SAWCUT LINE
- ASPHALT REMOVAL
- GRIND & OVERLAY LIGHT DUTY ASPHALT PAVEMENT
- CONCRETE REMOVAL
- CONSTRUCTION FENCING
- SILT FENCE
- EX TREE TO REMAIN
- EX TREE TO BE REMOVED
- TREE PROTECTION
- EX CURB TO BE REMOVED
- EX UTILITY TO BE REMOVED
- INLET PROTECTION
- LIMITS OF WORK

DEMOLITION NOTES

1. FLAG CLEARING LIMITS, ESTABLISH EROSION CONTROL MEASURES PER NOTES.
2. MAINTAIN EROSION CONTROL MEASURES THROUGHOUT THE PROJECT.
3. EXCAVATE BIO INFILTRATION CELL AS DIRECTED ON TESC PLAN.
4. RETAIN PAVEMENT AS LONG AS POSSIBLE DURING CONSTRUCTION FOR EROSION CONTROL.
5. REMOVE BUILDINGS AND FOOTINGS PER ARCHITECTURAL/STRUCTURAL PLANS
6. EXCAVATE AND REMOVE UNDERGROUND UTILITIES. COORDINATE WITH CITY OF SEQUIM PRIOR TO DISCONNECTION.
7. GRADE AND CONSTRUCT IMPROVEMENTS PER PLAN.
8. REMOVE EXISTING PAVEMENT AND INSTALL NEW PAVEMENT.
9. INSTALL LANDSCAPING AND GROUND COVER.
10. COMPLETE EXCAVATION AND BACKFILL OF BIO–INFILTRATION CELL.
11. CLEANUP AND CLOSE OUT PER SPECIFICATIONS.

SEDIMENT SETTLING REQUIREMENTS
TOTAL SURFACE AREA: 756 SF
TOTAL VOLUME: 1,397 CF (10,447 GALLONS)

BIORETENTION EXCAVATION CAN BE USED FOR SEDIMENT SETTLING PROVIDED THAT THE BOTTOM AREA IS LEFT A MINIMUM OF 1 FOOT ABOVE THE FINISHED GRADE ELEVATION OF THE BIORETENTION AND ALL SEDIMENT IS REMOVED PRIOR TO PLACEMENT OF BIORETENTION AGGREGATE SOIL. CONTRACTOR SHALL PROVIDE BAKER TANKS IF NEEDED FOR ADDITIONAL STORAGE. EXCAVATIONS FOR SEDIMENT SETTLING SHALL NOT INTERFERE WITH EXISTING SCHOOL OPERATION OR PARKING. INFILTRATION TRENCHES SHALL NOT BE USED FOR ANY SEDIMENT SETTLING ACTIVITY.

BIORETENTION AREA PROTECTION NOTES:

- CONTRACTOR TO STAKE LIMIT OF BIORETENTION AREAS AT THE START OF CONSTRUCTION AND PROTECT FROM CONSTRUCTION VEHICLE TRAFFIC.
- DO NOT EXCAVATE BIORETENTION AREAS TO SUB–GRADE UNTIL JUST PRIOR TO INSTALLATION OF BIORETENTION SOIL AND PLANTING. GEOTECHNICAL ENGINEER TO REVIEW BIORETENTION SUBGRADE AND CONFIRM INFILTRATION RATE MIN 30 IN/HR. PRIOR TO INSTALLATION OF SOIL AND PLANTING.
- DO NOT ALLOW CONSTRUCTION STORMWATER RUNOFF TO ENTER FULLY EXCAVATED BIORETENTION AREAS OR INFILTRATION TRENCHES.

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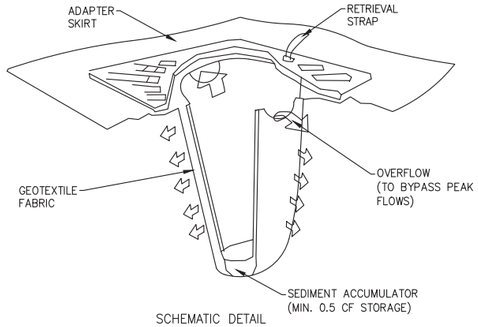
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TESC & DEMOLITION

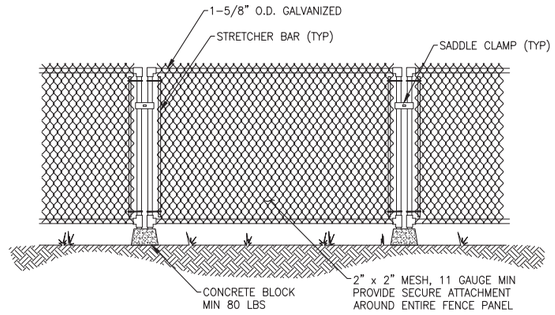
C1.2



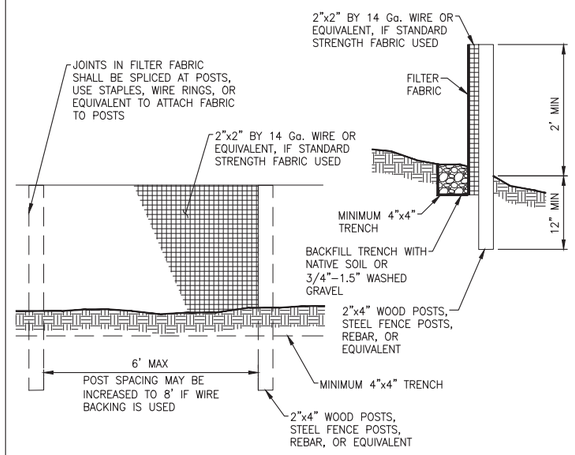
SCHEMATIC DETAIL

PROVIDE "ULTRA-DRAIN GUARD INLET FILTER" OR APPROVED EQUAL
MANUFACTURE NAME: ACF ENVIRONMENTAL

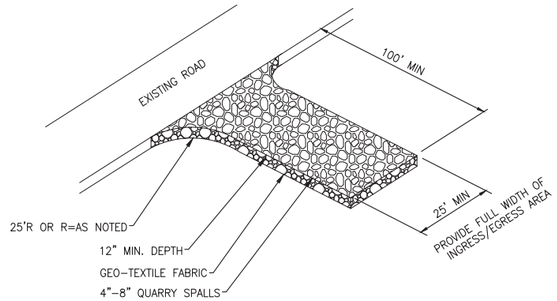
NTS
INLET PROTECTION 1



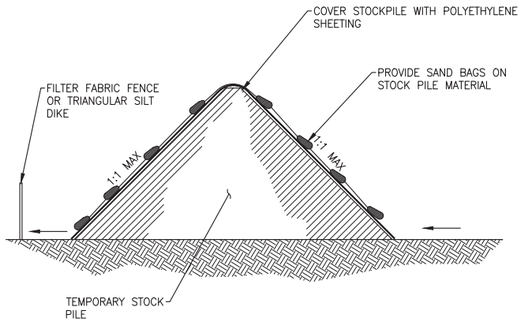
NTS
CONSTRUCTION FENCING 2



NTS
SILT FENCE 3



NTS
CONSTRUCTION ENTRANCE 4



NOTES:
COMPACT STOCK PILE MATERIAL PER GEOTECHNICAL RECOMENDATIONS

NTS
STOCK PILE 5

NTS
NOT USED 6

NTS
NOT USED 7

NTS
NOT USED 8

NTS
NOT USED 9

NTS
NOT USED 10

NTS
NOT USED 11

NTS
NOT USED 12

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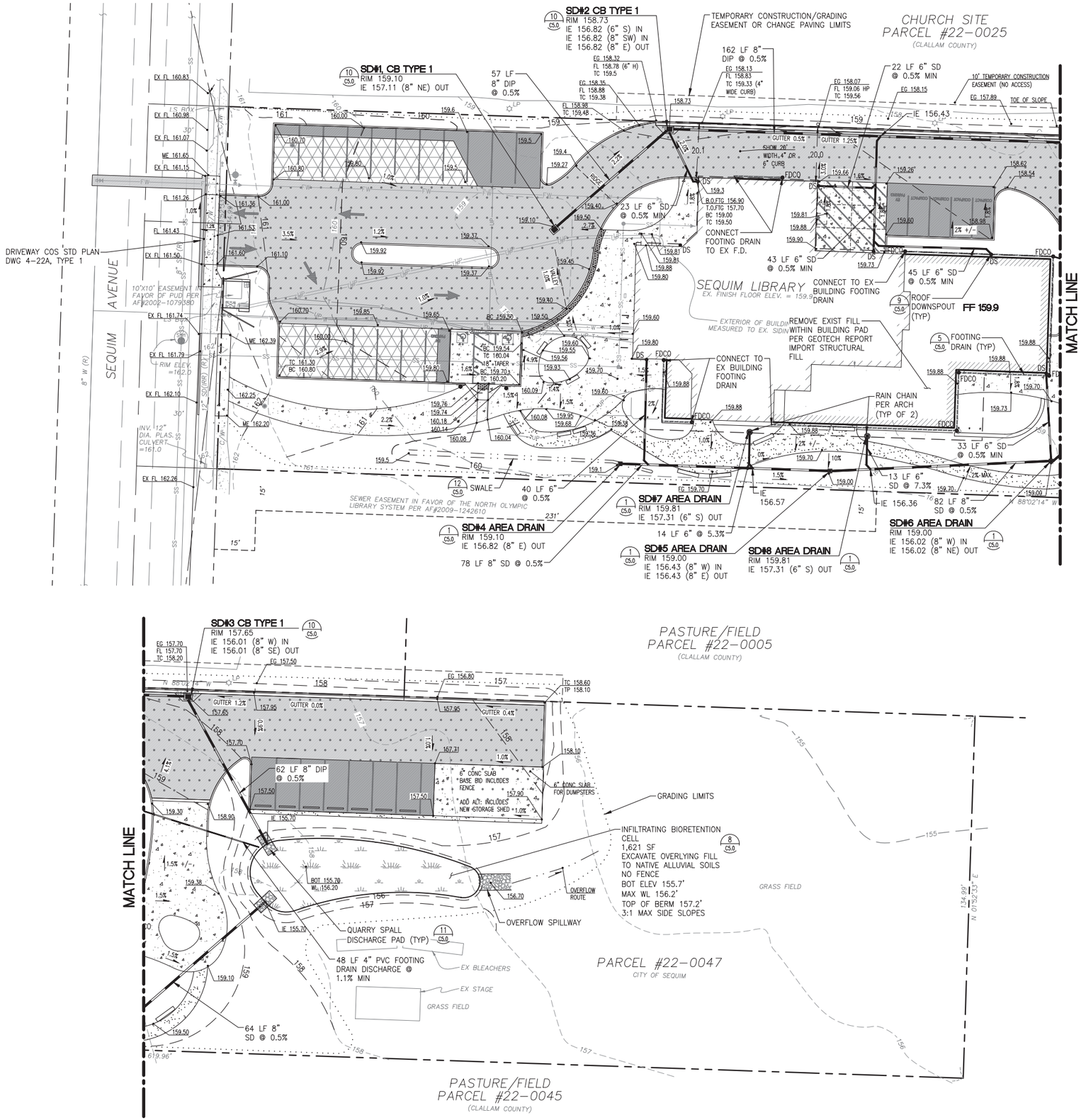
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TESC DETAILS

C1.3





LEGEND

- PROPERTY LINE
- EX CONTOUR (INDEX)
- EX CONTOUR
- PROPOSED CONTOUR (INDEX)
- PROPOSED CONTOUR
- SPOT ELEVATION
- FF 78.0 FINISHED FLOOR ELEVATION
- EX BUILDING
- PROPOSED BUILDING
- CONCRETE PAVING PER LANDSCAPE
- CONCRETE PAVEMENT
- TACTILE WARNING STRIP
- LIGHT DUTY ASPHALT (AC) PAVEMENT
- HEAVY DUTY ASPHALT (AC) PAVEMENT
- GRIND & OVERLAY LIGHT DUTY ASPHALT PAVEMENT
- GRAVEL SURFACING PER LANDSCAPE
- VERTICAL CURB
- BIORETENTION CELL
- QUARRY SPALL DISCHARGE PAD
- AREA DRAIN
- CATCH BASIN TYPE 1
- STORM DRAINAGE PIPE
- FDCO FOOTING DRAIN CLEANOUT
- DS DOWNSPOUTS
- FOOTING/SUBSURFACE DRAIN
- FIRE HYDRANT
- WATER FITTINGS
- WATER SERVICE LINES
- WATER METER
- WATER SERVICE LINES
- FIRE SERVICE LINE
- FIRE SERVICE VAULT
- FIRE SERVICE CONNECTION
- SS SEWER LINES
- SEWER CLEANOUT
- RIDGE RIDGE LINE
- GRADING LIMITS

EARTHWORK	
CUT:	1,150 CY
FILL:	1,500 CY

QUANTITIES PROVIDED FOR PERMIT ONLY, AND SHALL NOT BE USED FOR BIDDING.

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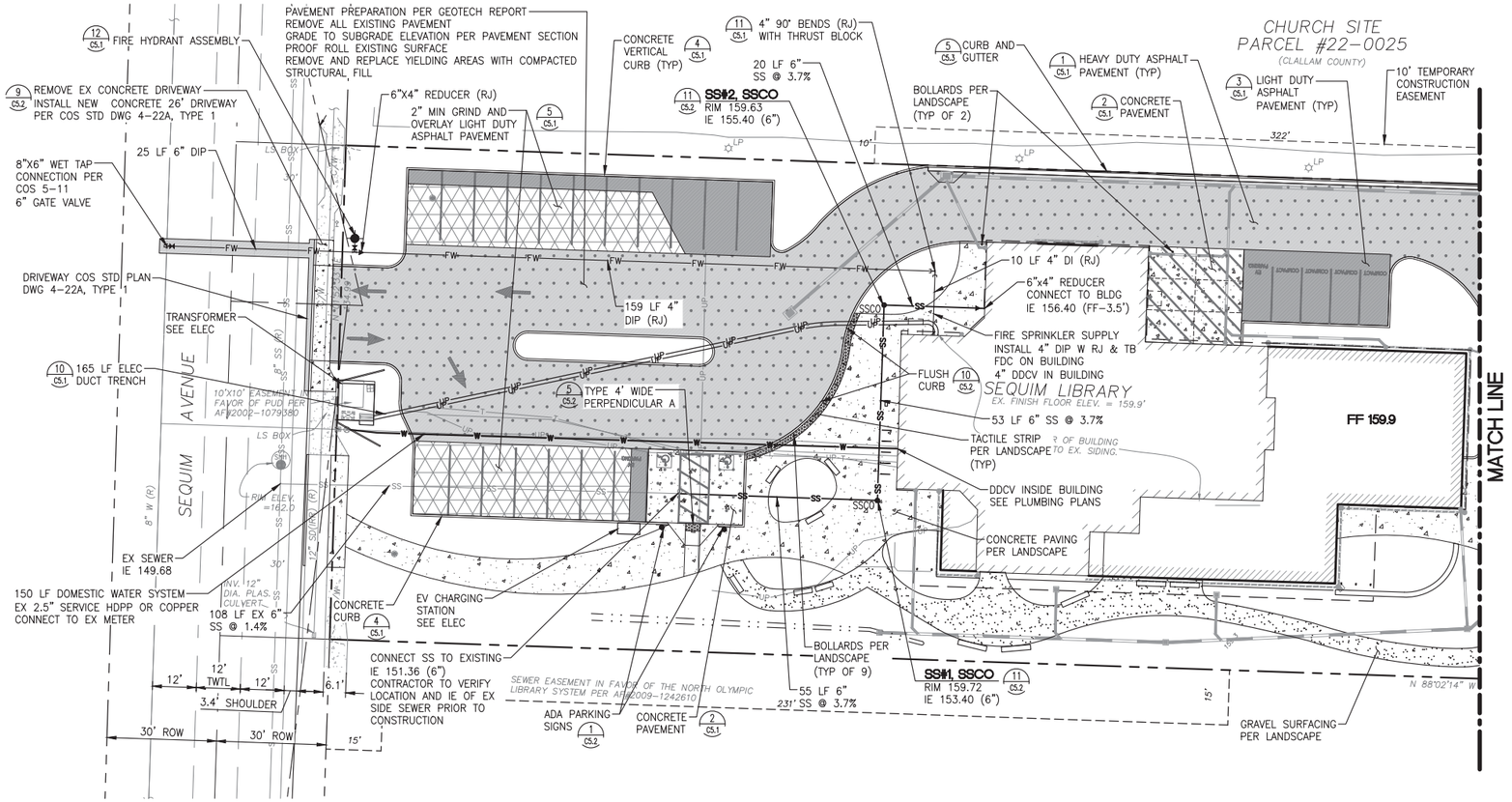
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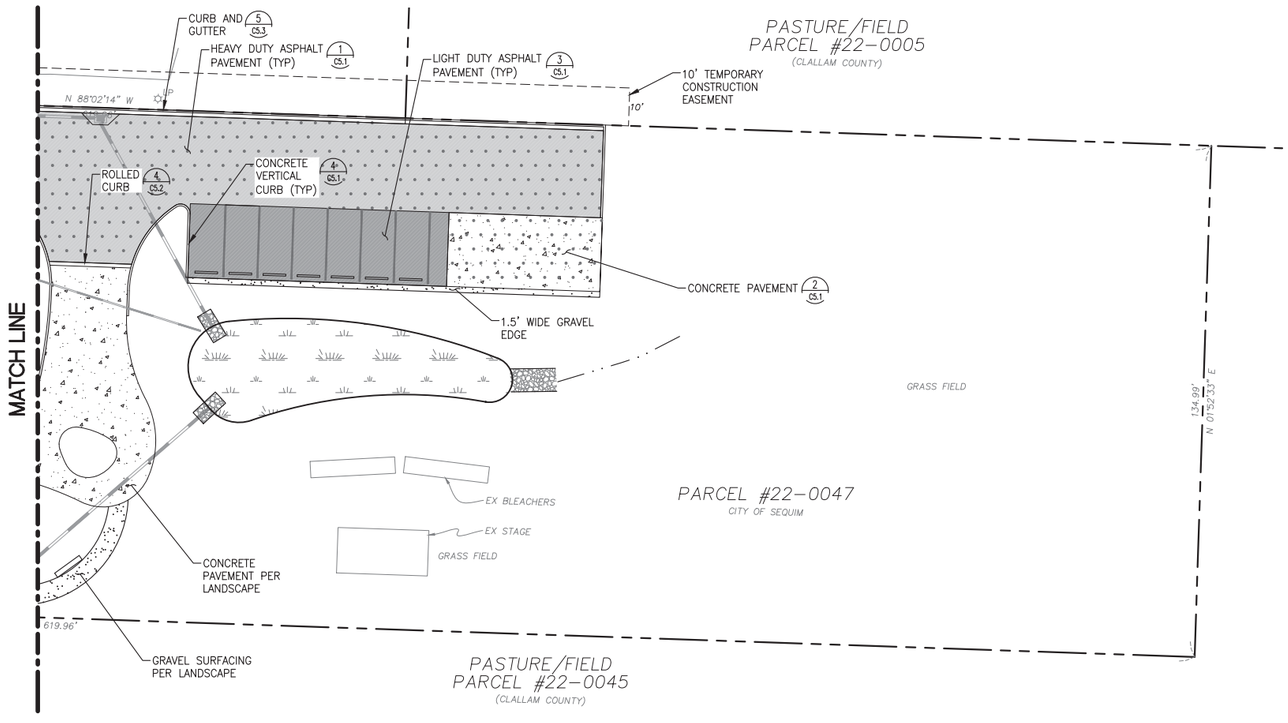
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GRADING & DRAINAGE

C2.0





N

20 0 10 20 40

Scale 1"=20'

LEGEND

- PROPERTY LINE
- FF 78.0 FINISHED FLOOR ELEVATION
- EX BUILDING
- PROPOSED BUILDING
- CONCRETE PAVING PER LANDSCAPE
- CONCRETE PAVEMENT
- TACTILE WARNING STRIP
- LIGHT DUTY ASPHALT (AC) PAVEMENT
- HEAVY DUTY ASPHALT (AC) PAVEMENT
- GRIND & OVERLAY LIGHT DUTY ASPHALT PAVEMENT
- GRAVEL SURFACING PER LANDSCAPE
- VERTICAL CURB
- BIORETENTION CELL
- QUARRY SPALL DISCHARGE PAD
- AREA DRAIN
- CATCH BASIN TYPE 1
- STORM DRAINAGE PIPE
- FOOTING DRAIN CLEANOUT
- DOWNSPOUTS
- FOOTING/SUBSURFACE DRAIN
- FIRE HYDRANT
- WATER FITTINGS
- WATER SERVICE LINES
- WATER METER
- WATER SERVICE LINES
- FIRE SERVICE LINE
- FIRE SERVICE VAULT
- FIRE SERVICE CONNECTION
- SSCO SS SEWER LINES
- SEWER CLEANOUT

SEWER NOTE:

1. POTHOLE AND CONFIRM DEPTH OF SEWER CONNECTION POINT PRIOR TO INSTALLING SEWER.

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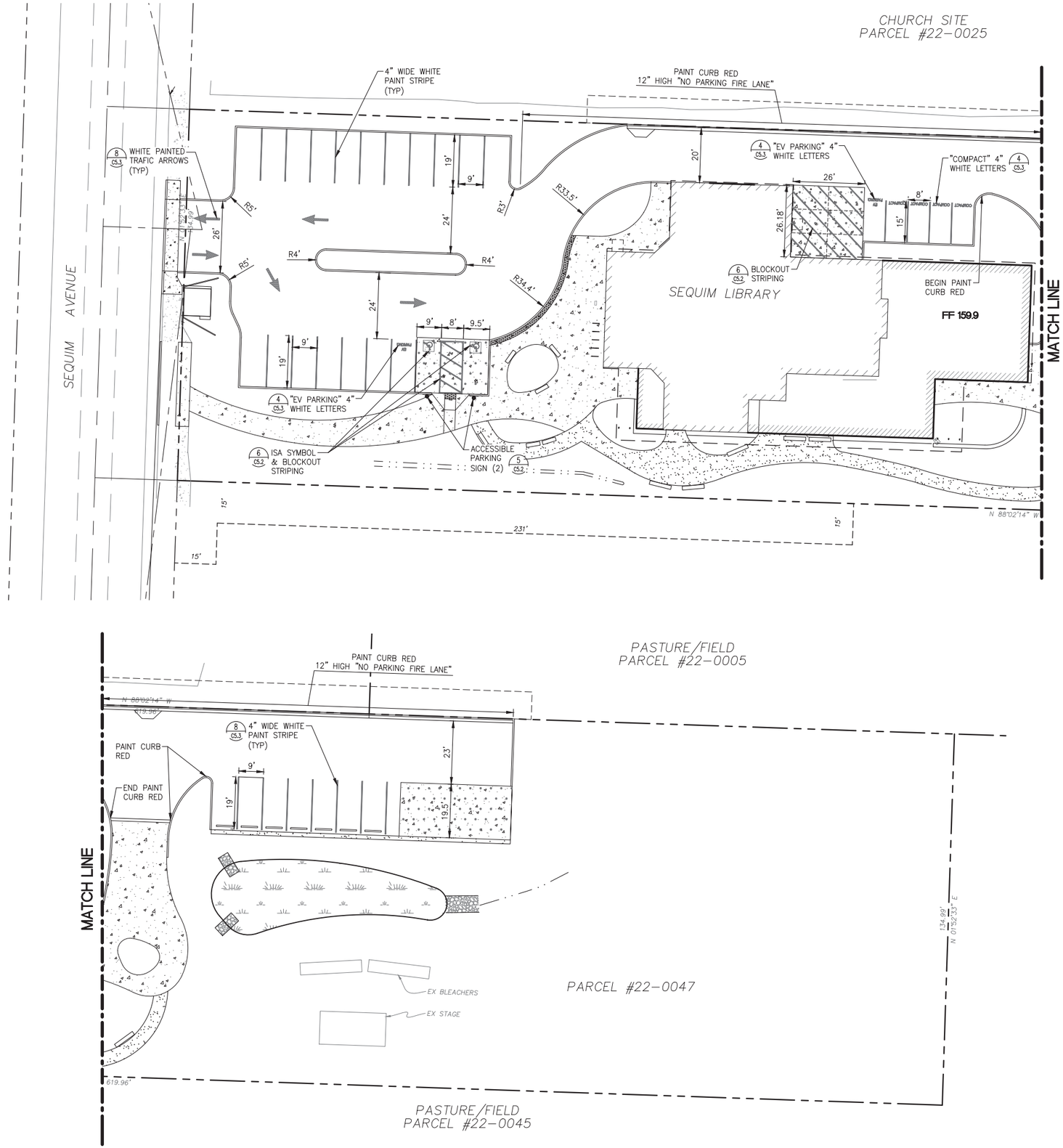
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UTILITY & PAVING

C3.0



20 0 10 20 40

Scale 1"=20'

LEGEND

- PROPERTY LINE
- FF 78.0 FINISHED FLOOR ELEVATION
- EX BUILDING
- PROPOSED BUILDING
- CONCRETE PAVING PER LANDSCAPE
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- VERTICAL CURB
- BIORETENTION CELL

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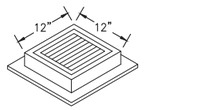
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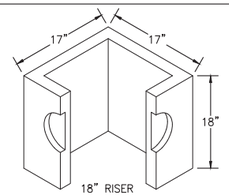
STRIPING AND CHANNELIZATION

C4.0

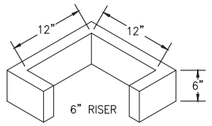
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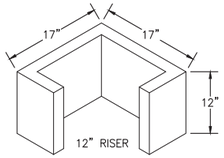
12" X 12" FRAME AND GRATE (SATHER MANUFACTURING 1212 FRAME AND GRATE OR APPROVED EQUAL)



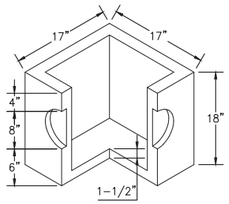
18" RISER



6" RISER



12" RISER

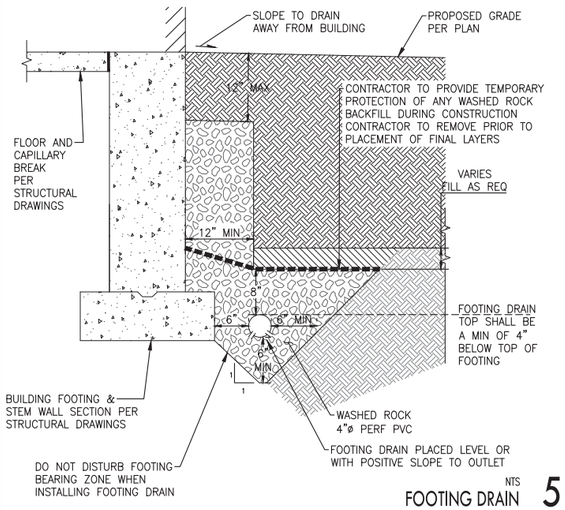


18" JUNCTION BOX

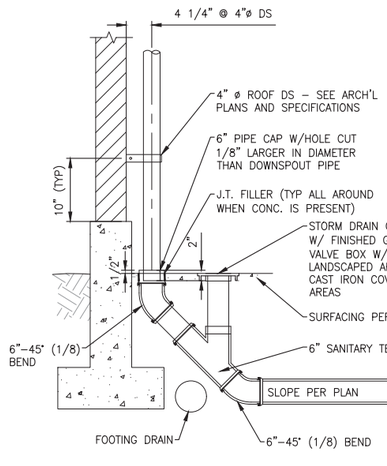
GRATES IN WALKWAYS, PLAZAS AND PEDESTRIAN AREAS MUST BE A.D.A. COMPLIANT
SEE WSDOT STD PLAN B–30.15–00.

17" X 17" AREA DRAIN BY CUZ CONCRETE PRODUCTS OR EQUAL

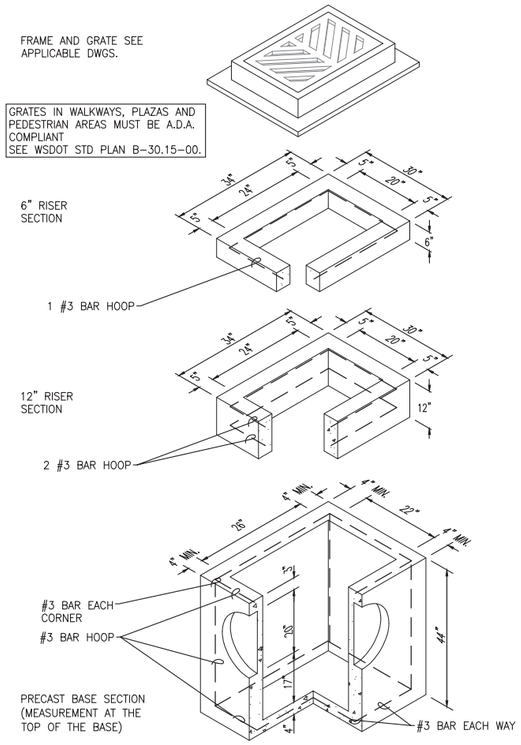
NTS
AREA DRAIN 1



NTS
FOOTING DRAIN 5



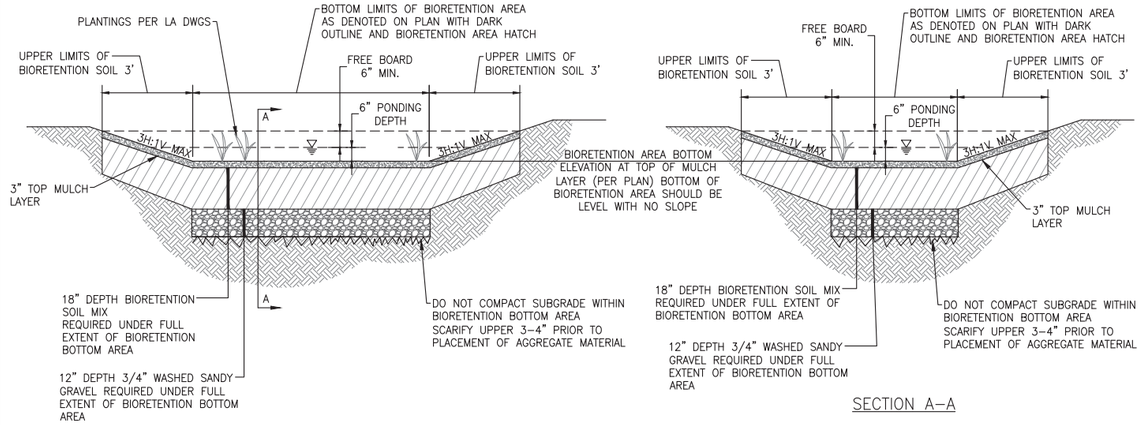
NTS
ROOF DOWNSPOUT 9



NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST–IN–PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIA. OF 20". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
6. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIA. PLUS CATCH BASIN WALL THICKNESS.
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'–0".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2"/FT.
9. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR–F–621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON–ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
11. FOR CATCH BASINS IN PARKING LOTS REFER TO WSDOT STD PLAN B–5.60–01.
12. EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.
13. CATCH BASIN INSTALLATION SHALL BE PER CONTRACT DOCUMENTS AND DETAILS.

NTS
CATCH BASIN TYPE 1 10

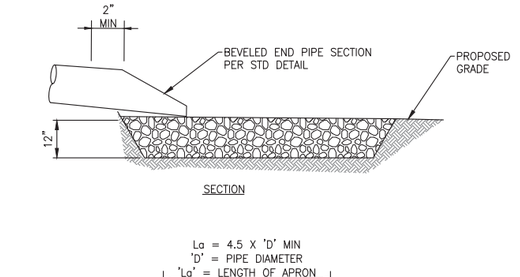


SECTION A–A

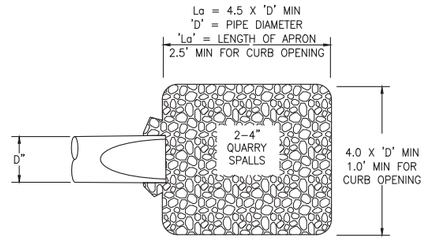
CONSTRUCTION SEQUENCE FOR BIORETENTION AREA

1. INSTALL TEMPORARY SEDIMENT CONTROL BMPS AS SHOWN ON PLAN.
2. COMPLETE SITE GRADING. PROVIDE PROTECTION SO THAT DRAINAGE IS PROHIBITED FROM ENTERING BIORETENTION CONSTRUCTION AREA.
3. SITE STABILIZATION TO BE COMPLETE PRIOR TO INSTALLATION OF BIORETENTION AREA. BIORETENTION AREAS THAT WERE USED AS TEMPORARY SEDIMENT TRAPS SHOULD BE EXCAVATED 6 INCHES BELOW THE BOTTOM OF THE SEDIMENT TRAP PRIOR TO CONSTRUCTION OF BIORETENTION AREA.
4. EXCAVATE BIORETENTION AREA TO PROPOSED DEPTH AND SCARIFY THE TOP 3"–4" OF EXISTING SOIL SURFACES. DO NOT COMPACT NATIVE SUBGRADE.
5. AFTER EXCAVATION, CONTRACTOR SHALL COORDINATE WITH GEOTECHNICAL ENGINEER, WHO SHALL VERIFY SUBGRADE INFILTRATION RATES USING FALLING HEAD PERCOLATION TEST METHOD, AS DESCRIBED IN APPENDIX III–A OF THE 2021 PIERCE COUNTY SWSDM. REPORT FINDINGS TO ENGINEER OF RECORD AND COUNTY INSPECTOR. THE SITE SOILS WERE FOUND TO BE HIGHLY INFILTRATIVE, BUT THE HIGHEST FIELD INFILTRATION RATE RECOGNIZED BY PIERCE COUNTY IS 60 INCHES PER HOUR. AFTER APPLYING THE APPROPRIATE CORRECTION FACTORS TO THE TESTING RESULTS, THE DESIGN INFILTRATION RATE USED IS 30 INCHES PER HOUR.
6. INSTALL PVC SLOTTED UNDERDRAIN PIPE PER PLAN.
7. BACKFILL BIORETENTION AREA WITH BIORETENTION SOIL MIX AND AGGREGATE MATERIAL. OVERFILLING IS RECOMMENDED TO ACCOUNT FOR SETTLEMENT. LIGHT HAND TAMPING IS ACCEPTABLE IF NECESSARY.
8. BIORETENTION SOIL MIX SHALL CONSIST OF THE FOLLOWING:
   - AGGREGATE TO COMPOST RATIO: 60% MINERAL AGGREGATE (WITH LESS THAN 5% FINES), 40% COMPOST (MEET REQUIREMENTS IN WAC 173–350–220)
   - TOTAL BIORETENTION SOIL MIX ORGANIC CONTENT SHALL BE 4–8% (BY DRY WEIGHT)
   - BIORETENTION SOIL DEPTH SHALL BE A MINIMUM OF 18–INCHES
   - SEE PLANTING SPECIFICATIONS SECTION 32 9000 FOR ADDITIONAL BIORETENTION SOIL REQUIREMENTS
9. PRESOAK THE PLANTING SOIL PRIOR TO PLANTING VEGETATION TO AID IN SETTLEMENT.
10. COMPLETE FINAL GRADING TO ACHIEVE PROPOSED DESIGN ELEVATIONS. LEAVE SPACE FOR UPPER LAYER OF MULCH AS SPECIFIED ON PLANS.
11. PLANT VEGETATION ACCORDING TO PLANTING PLAN.
12. MULCH AND INSTALL EROSION PROTECTION AT SURFACE FLOW ENTRANCES WHERE NECESSARY UNTIL ENTIRE SITE IS STABILIZED. MULCH MUST BE WOOD CHIPS CONSISTING OF SHREDDED OR CHIPPED HARDWOOD. MULCH SHOULD NOT CONTAIN WEED SEEDS, GRASS CLIPPINGS, AND LARGE CHUNKS OF BARK.
13. CONTRACTOR IS RESPONSIBLE FOR KEEPING BIORETENTION SOIL SEDIMENT FREE AFTER INSTALLATION AND UPON COMPETITION OF CONSTRUCTION, AND ANY SEDIMENT CONTAMINATED BIORETENTION SOIL SHALL BE REMOVED AND REPLACED AT THE CONTRACTORS EXPENSE.
14. POST–CONSTRUCTION, BIORETENTION SOIL MIX SHALL BE TESTED PER SECTION 3.4.7, VOLUME III OF PIERCE COUNTY STORMWATER AND SITE DEVELOPMENT MANUAL.

NTS
INFILTRATING BIORETENTION CELL 8

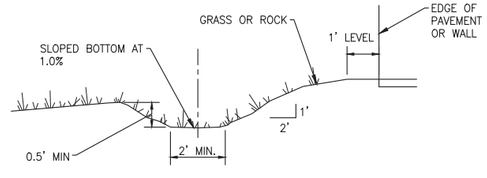


SECTION



PLAN

NTS
QUARRY SPALL DISCHARGE PAD 11



NOTES:

POSITIVE DRAINAGE TO CB OUTLET (SD#4)

NTS
SWALE 12

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f. 206.973.5344
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MARC J. SERR — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
5/3/23

NOLS
SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION

630 N SEQUIM AVE
SEQUIM, WA 98382

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Checked:	MJS
Date:	5/3/23
Scale:	As indicated

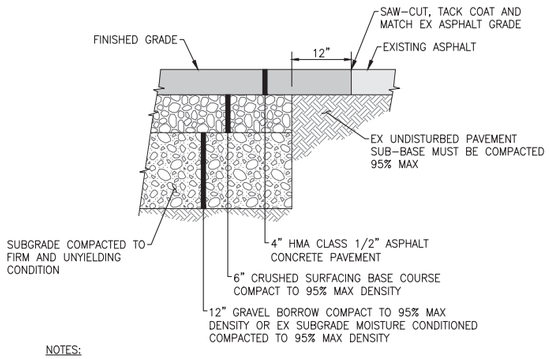
Revisions:

No.	Date	Remarks

PERMIT DOCUMENTS

DRAINAGE DETAILS

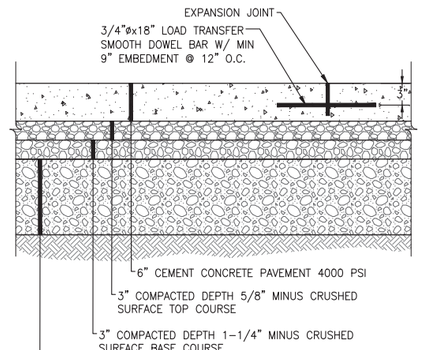
C5.0



NOTES:

1. IF EX PAVEMENT SECTION IS THICKER, MATCH EX SECTION. OTHERWISE CONSTRUCT SECTION SHOWN.
2. SAWCUT FULL DEPTH WHERE NEW PAVEMENT ABUTS EXISTING AND APPLY TACK COAT.
3. PLACE HMA IN ACCORDANCE WITH WSDOT APWA SECTION 5–04.
4. PROOF ROLL AND REMOVE ANY SOFT SPOTS. REPLACE REMOVED MATERIAL WITH GRAVEL BORROW. CONTRACTOR SHALL TEST AND VERIFY SUBGRADE MEETS COMPACTION REQUIREMENTS PRIOR TO PAVING.

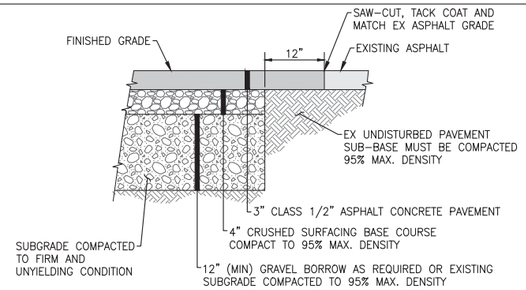
NTS
HEAVY DUTY ASPHALT 1



NOTES:

1. PLACE CONTRACTION JOINTS AT MAX 10' O.C. IN BOTH DIRECTIONS ON SLAB. CONTRACTION JOINTS SHALL BE MADE BY SAW–CUT OR TOOLED INTO CONCRETE DURING PLACEMENT.
2. CONCRETE FINISH & JOINTING PER LANDSCAPE.

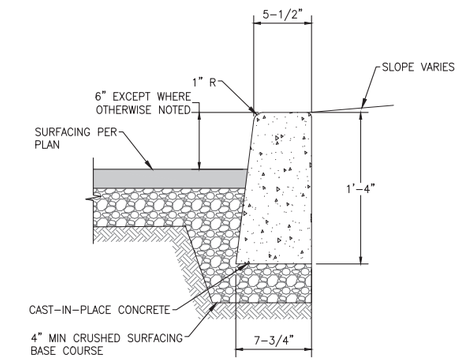
NTS
CONCRETE PAVEMENT 2



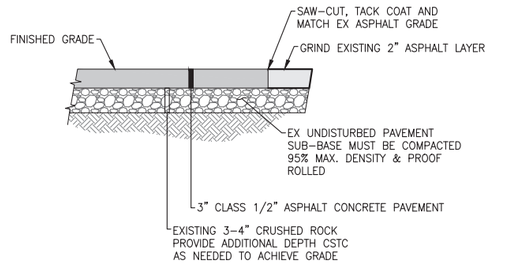
NOTES:

1. SAW–CUT FULL DEPTH WHERE NEW PAVEMENT ABUTS EXISTING AND APPLY TACK COAT.
2. PLACE ASPHALT IN ACCORDANCE WITH WSDOT APWA SECTION 5–04.
3. PROOF ROLL AND REMOVE ANY SOFT SPOTS. REPLACE REMOVED MATERIAL WITH GRAVEL BORROW. CONTRACTOR SHALL TEST AND VERIFY SUBGRADE MEETS COMPACTION REQUIREMENTS PRIOR TO PAVING.

NTS
LIGHT DUTY ASPHALT PAVEMENT 3



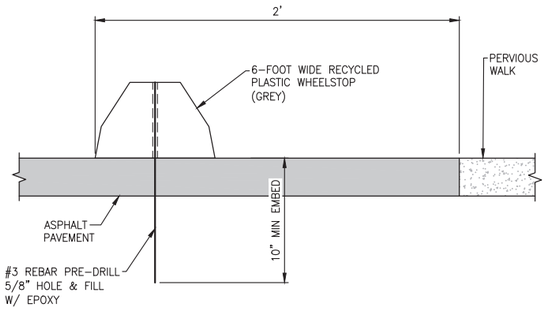
NTS
CONCRETE VERTICAL CURB 4



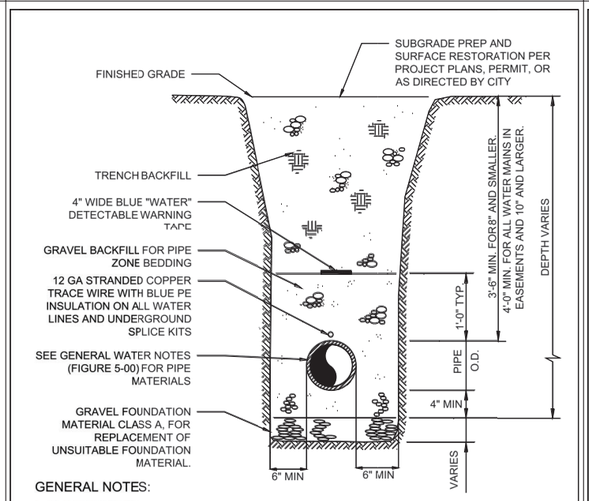
NOTES:

1. SAW–CUT FULL DEPTH WHERE NEW PAVEMENT ABUTS EXISTING AND APPLY TACK COAT.
2. PLACE ASPHALT IN ACCORDANCE WITH WSDOT APWA SECTION 5–04.
3. PROOF ROLL AND REMOVE ANY SOFT SPOTS. REPLACE REMOVED MATERIAL WITH GRAVEL BORROW. CONTRACTOR SHALL TEST AND VERIFY SUBGRADE MEETS COMPACTION REQUIREMENTS PRIOR TO PAVING.

NTS
GRIND AND OVERLAY LIGHT DUTY 5



NTS
WHEELSTOP 9

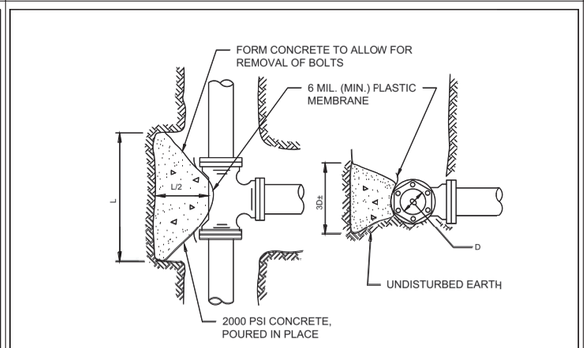


GENERAL NOTES:

1. FOUNDATION MATERIAL, BEDDING, AND BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THIS DETAIL, OR THE MOST CURRENT WSDOT STANDARD SPECIFICATIONS, AND/OR PROJECT OR PERMIT SPECIFIC REQUIREMENTS, WHICHEVER IS MOST STRINGENT.
2. FOR TRENCH BACKFILL, PLACE IN 6 INCH MAXIMUM LOOSE LIFTS AND COMPACTED TO 95% AND ±3% OF OPTIMUM MOISTURE CONTENT PER ASTM D1557. THICKER LIFTS ALLOWED ONLY WITH ENGINEER'S PRIOR WRITTEN PERMISSION.
3. DEPTH OF COVER IN EXCESS OF 7-FEET REQUIRES CITY APPROVAL.
4. CLAY OR BENTONITE DAMS SHALL BE INSTALLED ACROSS THE TRENCH AND TO THE FULL DEPTH OF THE GRANULAR MATERIAL IN ALL AREAS OF STEEP SLOPES, STREAM CROSSINGS, AND WETLANDS TO PREVENT MIGRATION OF WATER ALONG THE PIPELINE.
5. TRENCH SECTIONS FOR WATER MAINS, FIRE HYDRANTS, BLOW OFFS, AIR VALVES, WATER SERVICES, AND OTHER WATER LINE APPURTENANCES SHALL BE SIMILAR TO THIS WATER LINE TRENCH SECTION.

CITY OF SEQUIM	WATER LINE TRENCH SECTION	REVISION NO.	DATE	FIGURE
		0	07/11/2022	5-02

NTS
CITY OF SEQUIM WATER LINE TRENCH SECTION 5-02 & ELECTRICAL DUCT 10



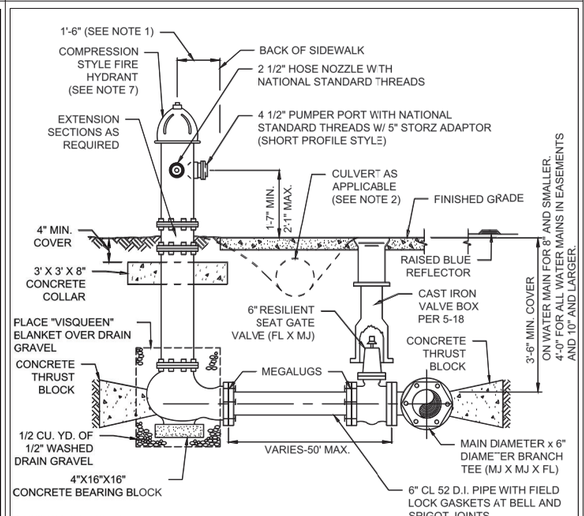
MINIMUM BEARING AREA TABLE					
FITTING D	TEE	90°	45°	22 1/2°	11 1/4°
6"	4 SQ. FT.	6 SQ. FT.	3 SQ. FT.	2 SQ. FT.	2 SQ. FT.
8"	7 SQ. FT.	10 SQ. FT.	6 SQ. FT.	3 SQ. FT.	2 SQ. FT.
10"	10 SQ. FT.	15 SQ. FT.	9 SQ. FT.	5 SQ. FT.	3 SQ. FT.
12"	14 SQ. FT.	22 SQ. FT.	12 SQ. FT.	6 SQ. FT.	4 SQ. FT.
16"	25 SQ. FT.	38 SQ. FT.	21 SQ. FT.	11 SQ. FT.	7 SQ. FT.
18"	32 SQ. FT.	48 SQ. FT.	27 SQ. FT.	14 SQ. FT.	8 SQ. FT.

GENERAL NOTES:

1. BEARING AREA TABLE BASED ON 250 PSI PRESSURE AND 2000 PSF SOIL BEARING. IF PRESSURE IS GREATER OR SOIL BEARING IS LESS, THE THRUST BLOCK SIZE SHALL INCREASE.
2. THIS TABLE REPRESENTS THE "MINIMUM" CONSTRUCTION STANDARDS. THE DEVELOPER'S ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING THE APPROPRIATE SIZE OF ALL THRUST BLOCKS BASED ON EXISTING AND LOCAL CONDITIONS.
3. IN LIEU OF VERTICAL ANCHOR BLOCKS, PIPE BEND JOINTS AND STRAIGHT PIPE JOINTS ON BOTH VERTICAL BENDS SHALL BE RESTRAINED FOR LENGTHS AS NECESSARY TO RESIST PIPE JOINT SEPARATION BY A SAFETY FACTOR OF 2:1, USING "MEGALUGS", FIELD LOCK GASKETS (FOR DUCTILE IRON PIPE), BELL-AND-SPIGOT JOINT RESTRAINTS (SUCH AS ROMAC 611 SYSTEMS FOR PVC C900 PIPE), OR OTHER RESTRAINT SYSTEMS ACCEPTABLE TO THE CITY.
4. THE CITY WILL USE "EBAA IRON'S RESTRAINT LENGTH CALCULATOR" AT EBAA.COM/CALCULATOR/ FOR VERIFYING ADEQUACY OF RESTRAINED JOINT LENGTHS.

CITY OF SEQUIM	THRUST BLOCKS	REVISION NO.	DATE	FIGURE
		0	07/11/2022	5-07

NTS
CITY OF SEQUIM THRUST BLOCKS 5-07 11



GENERAL NOTES:

1. OR 3' FROM BACK OF CURB.
2. PROVIDE 8' MINIMUM OF CULVERT AND COVER, 12" MIN. DIA. OR EQUAL IN SIZE TO ADJACENT DITCH CROSSINGS. PIPE TO COUNTY, STATE OR CITY STANDARDS AS APPLICABLE.
3. PROVIDE MIN. 3'-0" CLEARANCE AND LEVEL AREA AROUND HYDRANT.
4. PAINT FIRE HYDRANT WITH TWO COATS SAFETY YELLOW.
5. STENCIL FOOTAGE TO VALVE ON HYDRANT UNDER PORT FACING GV.
6. REMOVE ALL CHAINS FOR FIRE HYDRANT CAPS.
7. ACCEPTABLE HYDRANTS: CLOW MEDALLION AND MUELLER CENTURION OR EAST JORDAN WATER MASTER 5CD250.
8. INSTALL BLUE FIRE HYDRANT REFLECTOR OFFSET 1 FOOT FROM ROAD CENTERLINE.
9. ALL FLANGES TORQUE TESTED TO MANUFACTURE RECOMMENDATIONS.
10. NO SERVICE CONNECTIONS SHALL BE MADE TO THE FIRE HYDRANT LINE UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

CITY OF SEQUIM	FIRE HYDRANT ASSEMBLY	REVISION NO.	DATE	FIGURE
		0	07/11/2022	5-08

NTS
CITY OF SEQUIM FIRE HYDRANT ASSEMBLY 5-08 12

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MARC J. SERRITELLA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
5/3/23

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Checked:	MJS
Date:	5/3/23
Scale:	As indicated

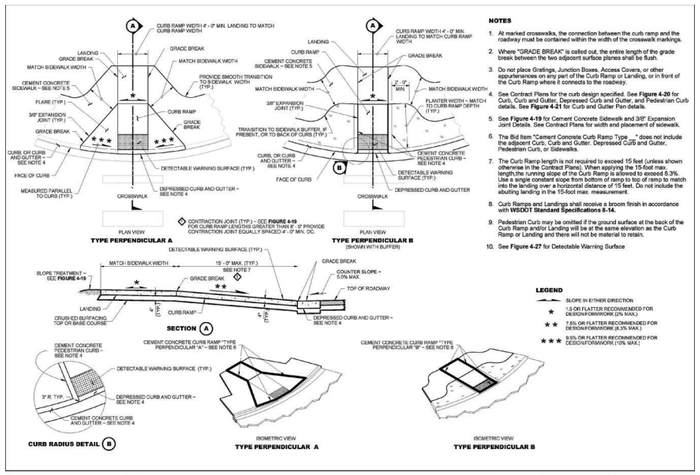
Revisions:

No.	Date	Remarks

PERMIT DOCUMENTS

PAVING & UTILITY DETAILS

C5.1



NOTES

1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in front of the Curb Ramp where it connects to the roadway.
4. See Contract Plans for the curb design specified. See **Figure 4-20** for Curb, Curb and Gutter, Depressed Curb and Gutter, and Pedestrian Curb details. See **Figure 4-21** for Curb and Gutter Pan details.
5. See **Figure 4-19** for Cement Concrete Sidewalk and 3/8" Expansion Joint Details. See Contract Plans for width and placement of sidewalk.
6. The Bid Item "Cement Concrete Curb Ramp Type ___" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length,the running slope of the Curb Ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the landing over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement.
8. Curb Ramps and Landings shall receive a broom finish in accordance with **WSDOT Standard Specifications 8-14.**
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.
10. See **Figure 4-27** for Detectable Warning Surface

LEGEND

SLOPE IN EITHER DIRECTION

★ 1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)

★★ 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)

★★★ 9.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (10% MAX.)

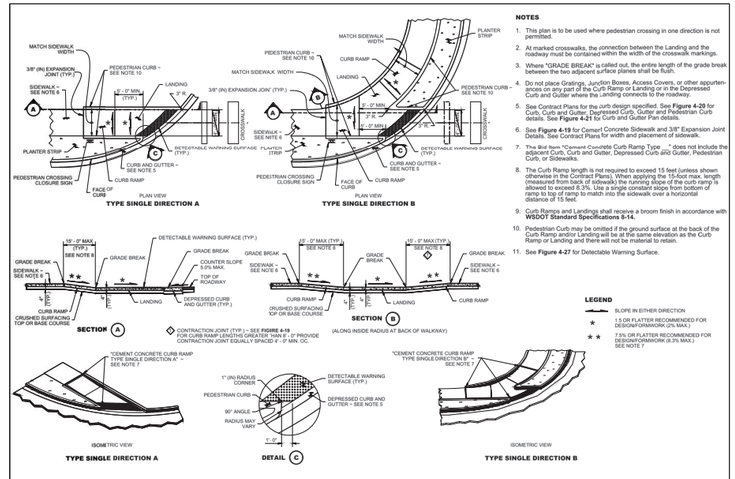
CITY OF SEQUIM

PERPENDICULAR CURB RAMP

REVISION NO.	DATE
0	1/11/2021

FIGURE 4-25

CITY OF SEQUIM PERPENDICULAR CURB RAMP 4-25 NTS **1**



NOTES

1. This plan is to be used where pedestrian crossing in one direction is not permitted.
2. At marked crosswalks, the connection between the Landing and the roadway must be contained within the width of the crosswalk markings.
3. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
4. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing or in the Depressed Curb and Gutter where the Landing connects to the roadway.
5. See Contract Plans for the curb design specified. See **Figure 4-20** for Curb, Curb and Gutter, Depressed Curb, Gutter and Pedestrian Curb details. See **Figure 4-21** for Curb and Gutter Pan details.
6. See **Figure 4-19** for Cement Concrete Sidewalk and 3/8" Expansion Joint Details. See Contract Plans for width and placement of sidewalk.
7. The Bid Item "Cement Concrete Curb Ramp Type ___" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
8. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
9. Curb Ramps and Landings shall receive a broom finish in accordance with **WSDOT Standard Specifications 8-14.**
10. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.
11. See **Figure 4-27** for Detectable Warning Surface.

LEGEND

SLOPE IN EITHER DIRECTION

★ 1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)

★★ 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.) SEE NOTE 7

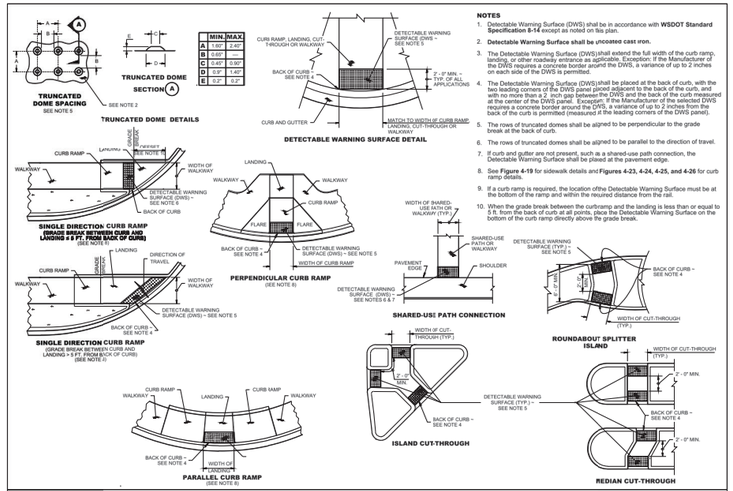
CITY OF SEQUIM

SINGLE DIRECTION CURB RAMP

REVISION NO.	DATE
0	1/11/2021

FIGURE 4-26

CITY OF SEQUIM SINGLE DIRECTION CURB RAMP 4-26 NTS **2**



NOTES

1. Detectable Warning Surface (DWS) shall be in accordance with **WSDOT Standard Specification 8-14** except as noted on this plan.
2. **Detectable Warning Surface shall be uncoated cast iron.**
3. The Detectable Warning Surface (DWS)shall extend the full width of the curb ramp, landing, or other roadway entrance as applicable. Exception: If the Manufacturer of the DWS requires a concrete border around the DWS, a variance of up to 2 inches on each side of the DWS is permitted.
4. The Detectable Warning Surface (DWS)shall be placed at the back of curb, with the two leading corners of the DWS panel placed adjacent to the back of the curb, and aligned so that the DWS is perpendicular to the direction of travel. Alignment shall be measured at the center of the DWS panel. Exception: If the Manufacturer of the selected DWS requires a concrete border around the DWS, a variance of up to 2 inches from the back of the curb is permitted (measured at the leading corners of the DWS panel).
5. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.
6. The rows of truncated domes shall be aligned to be parallel to the direction of travel.
7. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavement edge.
8. See **Figure 4-19** for sidewalk details and **Figures 4-23, 4-24, 4-25, and 4-26** for curb ramp details.
9. If a curb ramp is required, the location ofthe Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.
10. When the grade break between the curbsramp and the landing is less than or equal to 5 ft. from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp directly above the grade break.

CITY OF SEQUIM

DETECTABLE WARNING SURFACE

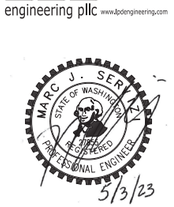
REVISION NO.	DATE
0	1/11/2021

FIGURE 4-27

CITY OF SEQUIM DETECTABLE WARNING SURFACE 4-27 NTS **3**

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f. 206.973.5344
www.ipdengineering.com



ROLLED CURB NTS **4**

EACH PARKING SPACE RESERVED FOR PERSONS WITH PHYSICAL DISABILITIES SHALL BE IDENTIFIED BY A REFLECTORIZED SIGN PERMANENTLY POSTED IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE CONSISTING OF A PROFILE VIEW OF A WHEELCHAIR WITH OCCUPANT IN WHITE ON DARK BLUE BACKGROUND. THE SIGN SHALL NOT BE SMALLER THAN 70 SQUARE INCHES IN AREA AND SHALL BE CENTERED ON AND JUST BEYOND THE FRONT EDGE OF THE PARKING STALL. SIGNS MAY ALSO BE HUNG ON THE WALL AT THE INTERIOR END OF THE PARKING SPACE. SIGN MOUNTING HEIGHT SHALL BE 60 INCHES ABOVE THE PARKING SPACE FINISHED GRADE.

AN ADDITIONAL SIGN SHALL ALSO BE POSTED, IN A CONSPICUOUS PLACE, AT EACH ENTRANCE TO OFF–STREET PARKING FACILITIES, OR IMMEDIATELY ADJACENT TO AND VISIBLE FROM EACH STALL OR SPACE. THE SIGN SHALL BE NOT LESS THAN 17 INCHES BY 22 INCHES IN SIZE WITH LETTERING NOT LESS THAN 1 INCH IN HEIGHT, WHICH CLEARLY AND CONSPICUOUSLY STATES THE FOLLOWING:

"UNAUTHORIZED VEHICLES PARKED IN DESIGNATED DISABLED PARKING SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR LICENSE PLATES ISSUED FOR PHYSICALLY DISABLED PERSONS MAY BE TOWED AWAY AT OWNER'S EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT _____ OR _____ OR BY TELEPHONING _____."

SIGN POSTS SHALL PER SIGN POST NOTES INDICATED ON DETAIL 12 THIS SHEET

ADA PARKING STALL SIGN NTS **5**

ISA SYMBOL (PAINTED WHITE) & BLOCKOUT STRIPING NTS **6**

CITY OF SEQUIM SIDE SEWER CLEANOUT V-S16 NTS **11**

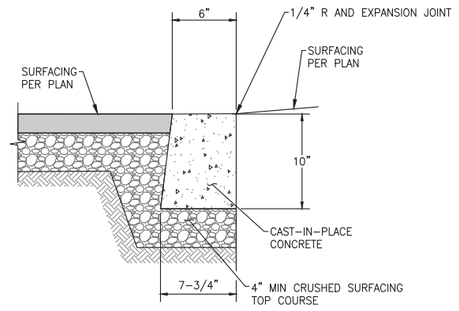
CITY OF SEQUIM

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3, & 4

REVISION NO.	DATE
0	1/11/2021

FIGURE 4-22A

CITY OF SEQUIM CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 1 4-22A NTS **9**



FLUSH CURB NTS **10**

NOLS
SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION

630 N SEQUIM AVE
SEQUIM, WA 98382

Drawn by:	KES
Checked:	MJS
Date:	5/3/23
Scale:	As indicated

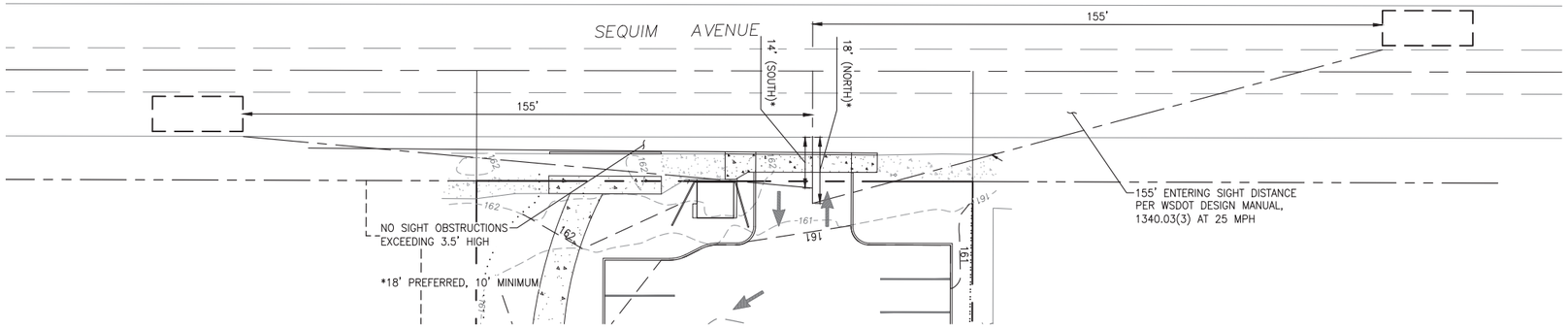
Revisions:

No.	Date	Remarks

PERMIT DOCUMENTS

PAVING & UTILITY DETAILS

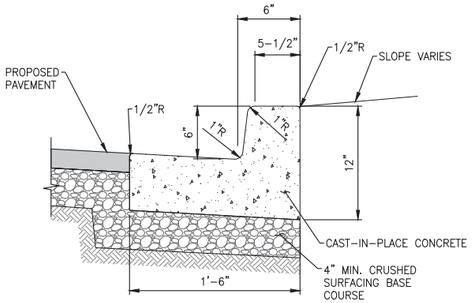
C5.2



1" = 10'
DRIVEWAY APPROACH 3

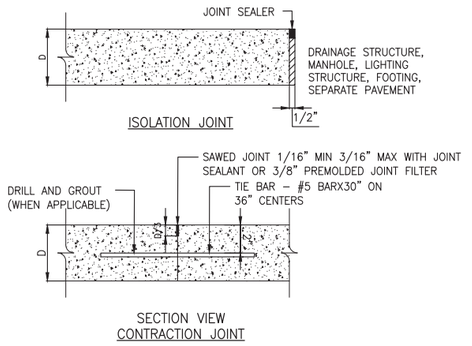


NTS
STENCILED LETTERING 4

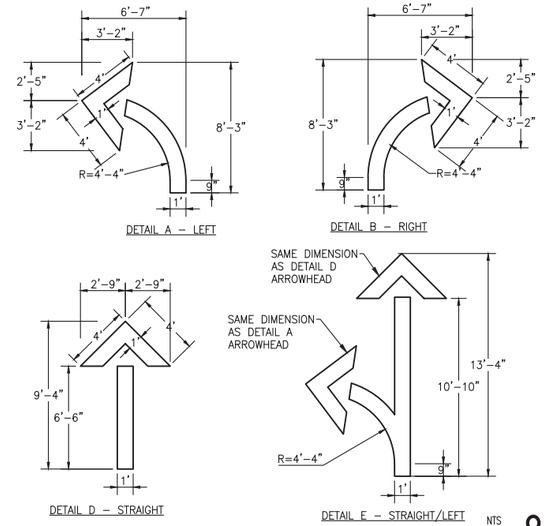


NTS
CURB AND GUTTER 5

NTS
NOT USED 6



NTS
CONCRETE PAVEMENT JOINTS 7

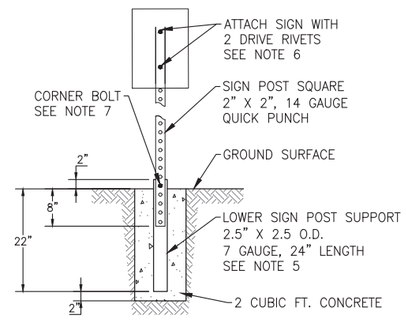


NTS
WHITE PAINTED TRAFFIC ARROWS 8

NTS
NOT USED 9

NTS
NOT USED 10

NTS
NOT USED 11



SITE SIGNS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
NO PARKING ANYTIME R7-101

NTS
SITE SIGNAGE 12

SHKS ARCHITECTS
1050 N. 38th St.
Seattle, WA 98103
PH: 206.675.9151
www.shksarchitects.com

LPD engineering pllc
1932 First Ave
Suite 201
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

MARC J. SERR
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
5/3/23

NOLS
SEQUIM BRANCH
LIBRARY
EXPANSION &
RENOVATION

630 N SEQUIM AVE
SEQUIM, WA 98382

Drawn by: KES
Checked: MJS
Date: 5/3/23
Scale: As indicated

Revisions:
No. Date Remarks

PERMIT DOCUMENTS

PAVING
DETAILS

C5.3

LPD engineering pllc

APPENDIX B

Design Calculations and Supporting Information

MGS FLOOD
PROJECT REPORT – BIORETENTION (FLOW CONTROL/OSM/WQ)

Program Version: MGSFlood 4.58
Program License Number: 201410003
Project Simulation Performed on: 04/28/2023 2:58 PM
Report Generation Date: 04/28/2023 2:58 PM

Input File Name: Sequim Library - Permit Bioretention.fld
Project Name: Sequim Library
Analysis Title: Permit Detention
Comments: Bioretention (infiltrating)

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 1
Precipitation Station : 95003205 Puget West 32 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951032 Puget West 32 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** **WATERSHED DEFINITION** **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.240	1.240
Area of Links that Include Precip/Evap (acres)	0.000	0.037
Total (acres)	1.240	1.277

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Forest, Flat 0.726
C, Lawn, Flat 0.321

SIDEWALKS/FLAT 0.193

Subbasin Total 1.240

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Lawn, Flat 0.321
ROOF TOPS/FLAT 0.257
SIDEWALKS/FLAT 0.189
PARKING/FLAT 0.473

Subbasin Total 1.240

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 0

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: New Ecy Bio Lnk1
Link Type: Ecology Bioretention Facility
Downstream Link: None

Floor Elevation (ft) : 100.00
Riser Crest Elevation (ft) : 100.50
Storage Depth (ft) : 0.50
Bottom Length (ft) : 73.7
Bottom Width (ft) : 22.0
Bottom Slope (ft/ft) : 0.000
Side Slopes (ft/ft) : Z1= 3.00 Z2= 3.00 Z3= 3.00 Z4= 3.00
Bottom Area (sq-ft) : 1621.
Area at Riser Crest El (sq-ft) : 1,917.
(acres) : 0.044
Volume at Riser Crest (cu-ft) : 1,184.
(ac-ft) : 0.027

Infiltration on Bottom and Sideslopes Selected

Soil Properties
Layer No Soil Name Thickness (ft)
1 ASTM 100 0.250
2 SMMWW 12 in/hr (Ecol 1.500
3 GRAVEL 1.000

KSat Safety Factor: None
Native Soil Infiltration Rate (in/hr) : 10.00

Underdrain Not Present

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 12.00
Common Length (ft) : 0.000
Riser Crest Elevation : 100.50 ft

Hydraulic Structure Geometry

Number of Devices: 0

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

********** Link: New Ecy Bio Lnk1 ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.005
1.11-Year	100.006
1.25-Year	100.006
2.00-Year	100.008
3.33-Year	100.010
5-Year	100.011
10-Year	100.013
25-Year	100.051
50-Year	100.121
100-Year	100.201

**********Water Quality Facility Data **********

----------SCENARIO: PREDEVELOPED

Number of Links: 0

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: New Ecy Bio Lnk1 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 361.91
Inflow Volume Including PPT-Evap (ac-ft): 363.09
Total Runoff Infiltrated (ac-ft): 363.09, 100.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 0.00
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 100.00%

**********Compliance Point Results **********

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Link: New Ecy Bio Lnk1

*** Point of Compliance Flow Frequency Data ***
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	9.293E-02	2-Year	0.000
5-Year	0.128	5-Year	0.000
10-Year	0.158	10-Year	0.000
25-Year	0.229	25-Year	0.000
50-Year	0.241	50-Year	0.000
100-Year	0.242	100-Year	0.000
200-Year	0.250	200-Year	0.000
500-Year	0.260	500-Year	0.000

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

**** Flow Duration Performance ****

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	0.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	0.0%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

**** LID Duration Performance ****

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	0.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	0.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS

Performance Flow Control Standard and LID Performance Standard Met

CONVEYANCE ANALYSIS WORK SHEET (25 YEAR)

	25 yrm in
DESIGN STORM	25.00
DATE	5/4/2023
DESIGNER	MJS/ACW
PROJECT	Sequim Library
LOCATION	Sequim, WA

PIPE RUN	Notes for proposed	LOCATE FROM	LOCATE TO	Impervious Acres	Pervious Acres	Impervious %	DESIGN FLOW (CFS) MGS Flood	PIPE MAT	PIPE SIZE (IN)	PIPE SLOPE (FT/FT)	PIPE LENGTH (FT)	RUNNING LENGTH (FT)	PIPE CAPACITY (CFS)	VELOCITY FULL (FPS)	Q/Qf	DESIGN VELOCITY (FPS)	TIME IN PIPE (MIN)	[UPPER STRUCTURE] INVERT ELEVATION in	Drop	out	G.E.	Depth IE to GE	COVER OVER TOP/PIPE
1		CB #1	CB #2	0.517	0.069	88%	**0.354**	DI	8	0.005	57	57	0.93	2.7	0.38	2.0	0.47	157.11		157.11	159.10	1.99	**1.17**
North System		CB #2	CB #3	0.517	0.069	88%	**0.354**	DI	8	0.005	162	219	0.93	2.7	0.38	2.0	1.34	156.83		156.83	158.73	1.90	**1.09**
		CB #3	Pond	0.517	0.069	88%	**0.354**	DI	8	0.005	62	281	0.93	2.7	0.38	2.0	0.51	156.02		156.02	157.65	1.63	**0.82**
		Pond																155.71		155.71			
2		CB#7	CB#6	0.235	0.110	68%	**0.167**	P	8	0.005	78	78	1.01	2.9	0.17	1.7	0.75	156.82		156.82	159.10	2.28	**1.46**
South System		CB#6	CB#5	0.235	0.110	68%	**0.167**	P	8	0.005	82	160	1.01	2.9	0.17	1.7	0.79	156.43		156.43	158.73	2.30	**1.48**
		CB#5	Pond	0.235	0.110	68%	**0.167**	P	8	0.005	64	224	1.01	2.9	0.17	1.7	0.61	156.02		156.02	157.70	1.68	**0.86**
		Pond																155.70		155.70			

BACKWATER ANALYSIS - 25 YEAR

DESIGN STORM 25.000 YEAR

DATE 5/4/2023

DESIGNER MJS/ACW

PROJECT Sequim Library

Designer

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		(13)	(14)		(15)		(16)	(17)		(18)	Est.	(19)	(20)	(21)	(22)	
									Barrel	Barrl			Enter		Enter	Exit	Outlet	Outlet	Inlet	Inlet	Appr		Bend	Junction	Junction		W.L. Depth	Depth	
Pipe		Q	Pipe	Pipe	"n"	Outlet	Inlet	Barrel	Vel.	Vel	TW	Frictn	HGL		Head	Head	HW	Ctrl	Ctrl	Ctrl	Vel		Head	Cross	Head	HW	Below	Above	
Segment		25	Lngth	Size	Value	Elevation	Elevation	Area	Q/A	Head	Elev	Loss	Elev	Ke	Loss	Loss	Depth	Elev	Depth	Elev	Head	Kb	Loss	Flow	Loss	Elev	G.E.	Crown	
CB to CB		(cfs)	(ft)	(in)		(ft)	(ft)	(sf)	(fps)	(fps)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(cfs)	(ft)	(ft)	(ft)	(ft)	
		0.354																											
CB #1	CB #2	0.354	57	8	0.012	156.83	157.11	0.348888889	1.01	0.02	157.43	0.04	157.47	0.2	0.00	0.02	0.02	157.49	0.56	157.67	0.00	0.00	0.00	0.25	0.00	157.67	1.43	-0.11	
CB #2	CB #3	0.354	162	8	0.012	156.02	156.83	0.348888889	1.01	0.02	156.62	0.12	156.73	0.2	0.00	0.02	0.02	156.75	0.56	157.38	0.02	0.00	0.00	0.25	0.01	157.37	1.36	-0.12	
CB #3	Pond	0.354	62	8	0.012	155.71	156.02	0.348888889	1.01	0.02	156.31	0.04	156.35	0.2	0.00	0.02	0.02	156.37	0.56	156.57	0.02	0.50	0.01	1.00	0.02	156.58	1.07	-0.10	
Pond																										156.20			
		0.167																											
CB#7	CB#6	0.167	78	8	0.011	156.43	156.82	0.348888889	0.48	0.00	157.03	0.01	157.04	0.2	0.00	0.00	0.00	157.04	0.54	157.36	0.00	0.00	0.00	0.25	0.00	157.36	1.74	-0.13	
CB#6	CB#5	0.167	82	8	0.011	156.02	156.43	0.348888889	0.48	0.00	156.62	0.01	156.63	0.2	0.00	0.00	0.00	156.64	0.54	156.97	0.00	0.00	0.00	0.25	0.00	156.97	1.76	-0.13	
CB#5	Pond	0.167	64	8	0.011	155.70	156.02	0.348888889	0.48	0.00	156.30	0.01	156.31	0.2	0.00	0.00	0.00	156.31	0.54	156.56	0.00	0.50	0.00	1.00	0.00	156.56	1.14	-0.13	
Pond																										156.20			

MGS FLOOD
PROJECT REPORT – CONVEYANCE (NORTH SYSTEM)

Program Version: MGSFlood 4.58
Program License Number: 201410003
Project Simulation Performed on: 05/02/2023 12:24 PM
Report Generation Date: 05/02/2023 12:25 PM

Input File Name: Conveyance - North.fld
Project Name: Sequim Library
Analysis Title: Conveyance
Comments: North System

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 1
Precipitation Station : 95003205 Puget West 32 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951032 Puget West 32 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.586	0.586
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.586	0.586

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
C, Lawn, Flat	0.069
SIDEWALKS/FLAT	0.517

Subbasin Total 0.586

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Lawn, Flat 0.069
SIDEWALKS/FLAT 0.517

Subbasin Total 0.586

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 0

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Subbasin: Subbasin 1

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.192	2-Year	0.192
5-Year	0.247	5-Year	0.247
10-Year	0.295	10-Year	0.295
25-Year	0.354	25-Year	0.354
50-Year	0.416	50-Year	0.416
100-Year	0.525	100-Year	0.525
200-Year	0.536	200-Year	0.536
500-Year	0.549	500-Year	0.549

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT – CONVEYANCE (SOUTH SYSTEM)

Program Version: MGSFlood 4.58
Program License Number: 201410003
Project Simulation Performed on: 05/02/2023 12:29 PM
Report Generation Date: 05/02/2023 12:29 PM

Input File Name: Conveyance - South.fld
Project Name: Sequim Library
Analysis Title: Conveyance
Comments: South System

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 1
Precipitation Station : 95003205 Puget West 32 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951032 Puget West 32 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** **WATERSHED DEFINITION** **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.345	0.345
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.345	0.345

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
C, Lawn, Flat	0.110
SIDEWALKS/FLAT	0.235

Subbasin Total 0.345

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Lawn, Flat 0.110
SIDEWALKS/FLAT 0.235

Subbasin Total 0.345

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 0

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Subbasin: Subbasin 1

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	9.126E-02	2-Year	9.126E-02
5-Year	0.117	5-Year	0.117
10-Year	0.139	10-Year	0.139
25-Year	0.167	25-Year	0.167
50-Year	0.207	50-Year	0.207
100-Year	0.254	100-Year	0.254
200-Year	0.256	200-Year	0.256
500-Year	0.257	500-Year	0.257

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Sediment Sizing Calculations

Per the 2019 Department of Ecology Stormwater Mangement Manual (DOE SWMM), Vol. 2

Project Name: Sequim Branch Library

Required Sediment Trap Surface Area (SA):

SA =2*Q/Vsed

Where:

Q = 2-year developed flow rate from MGS Flood

Vsed = Settling Velocity (0.00096 ft/sec)

Calculation:

multiplier =	2	
Q =	0.351	cfs
Vsed =	0.00096	fps
Required SA =	**731.3**	**square feet**

Sediment Pond Volume:

Length of Top Surface Area =	28	feet
Width of Top Surface Area =	27	feet
Surface Area Provided =	**756**	square feet
Side Slope =	3	(H:1V)
Total Depth of Sediment Trap =	3.5	feet
Bottom Length of Sediment Trap =	7	feet
Bottom Width of Sediment Trap =	6	feet
Total Pond Volume =	**1,397**	cubic feet
	10,447	gallons

Bioretention Cell Excavation Volume Provided = **2,626** cubic feet

MGS FLOOD
PROJECT REPORT – TESC SEDIMENT SIZING

Program Version: MGSFlood 4.58
Program License Number: 201410003
Project Simulation Performed on: 05/02/2023 10:23 AM
Report Generation Date: 05/02/2023 10:23 AM

Input File Name: Sequim Library - TESC sizing.fld
Project Name: Sequim Library
Analysis Title: TESC Sediment Sizing
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 1
Precipitation Station : 95003205 Puget West 32 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951032 Puget West 32 in MAP

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.240	1.240
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.240	1.240

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
C, Lawn, Flat	0.321
SIDEWALKS/FLAT	0.919

Subbasin Total 1.240

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------
-------Area (Acres) --------
C, Lawn, Flat 0.321
SIDEWALKS/FLAT 0.919

Subbasin Total 1.240

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 0

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Subbasin: Subbasin 1

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.351	2-Year	0.351
5-Year	0.451	5-Year	0.451
10-Year	0.537	10-Year	0.537
25-Year	0.650	25-Year	0.650
50-Year	0.786	50-Year	0.786
100-Year	0.972	100-Year	0.972
200-Year	0.983	200-Year	0.983
500-Year	0.996	500-Year	0.996

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

APPENDIX C

Construction Stormwater Pollution Prevention Plan (SWPPP)

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION
CONSTRUCTION SWPPP NARRATIVE
MAY 3, 2023

The following Construction Storm Water Pollution Prevention Plan (SWPPP) narrative is for the Sequim Branch Library Expansion and Renovation project. The site address is 630 N Sequim Avenue in Sequim, Washington (Tax Parcel No. 033020220047). The narrative supplements the Temporary Erosion and Sediment Control (TESC) plan. Together, the narrative and the drawings address the requirements of Volume II of the 2019 Department of Ecology (DOE) Stormwater Management Manual for Western Washington. Refer to the TESC plans (sheet C1.2) and TESC details (sheet C1.3) for more information regarding any erosion or sedimentation control measures involved in this project.

1. CONSTRUCTION STORMWATER POLLUTION PREVENTION ELEMENTS

1) **Mark Clearing Limits:** Clearing limits will be delineated on the TESC and Site Demolition plan. The actual limits of clearing will most likely be smaller than the limit of work area, but this identifies the maximum extent of the clearing limits. Areas impacted and not anticipated to be covered with final measures shall be stabilized using approved TESC methods.

2) **Establish Construction Access:** Construction access to the site will be via the existing asphalt parking area from North Sequim Avenue, west of the site. The contractor shall supplement the pavement access with quarry spalls as necessary, to prevent any damage to the existing surface from construction traffic. (BMP C105).

3) **Control Flow Rates:** Stormwater flow control during construction is expected to be done by routing runoff to a temporary sediment pond (BMP C241). Refer to the Sediment Facility Sizing calculations and the MGS Flood output included within Appendix B of the project's Stormwater Site Plan. The temporary sediment pond will utilize the excavation of the proposed bioretention cell on the east side of the site.

4) **Install Sediment Controls:** DOE approved BMPs for sediment controls are shown on the TESC plan. Sediment will be controlled using silt fence (BMP C233), storm drain inlet protection (BMP C220), and the proposed sediment pond (BMP C241).

5) **Stabilize Soils:** It is possible that some of the earthwork and grading may occur in wet weather conditions. The site must be stabilized and no soils will be allowed to remain unstabilized for more than two days between October 1st and April 30th. From May 1 through September 30, install cover measures to protect disturbed areas that will remain unworked for seven days or more. By October 8, seed all areas that will remain unworked from October 1 through April 30. Mulch all seeded areas.

   Exposed slopes will be protected by DOE-approved coverage methods. BMPs including but not limited to the following will be used to stabilize on-site soils during construction: C101, Preserving Natural Vegetation; C121, Mulching; C123, Plastic Covering; C130, Surface Roughening; C140, Dust Control; and T5.13 Post Construction Soil Amendment.

6) **Protect Slopes:** The DOE-approved BMPs for slope protection will be utilized during construction. Concentrated discharges shall not be allowed to flow over the top of steep slopes. BMPs including but not limited to the following are to be utilized to protect

slopes during construction: C101, Preserving Natural Vegetation; C121, Mulching; C123, Plastic Covering; C130, Surface Roughening; C140, Dust Control; C208, Triangular Silt Dike; C207, Check Dams; and C233, Silt Fence.

7) **Protect Drain Inlets:** Drainage structures in areas where no work occurs will remain and will be protected; discharge points to the public storm drain main line will also be protected. To prevent discharge of turbid water downstream, all existing catch basins located within the disturbance area and outside of the disturbance area within approximately 300 feet downstream of the site will be protected with storm drain inlet protection (BMP C220). Proposed inlets will also be protected with catch basin inserts, and where feasible, their outlets will be temporarily plugged until the site is stabilized. The Contractor shall remove inlet protection at the end of the project without releasing captured sediment into the storm system.

8) **Stabilize Channels and Outlets:** Channels are not proposed as part of this project and BMPs for channel stabilization are not expected. DOE-approved BMPs for channel stabilization include, but are not limited to: C200, Interceptor Dike and Swale; and C207, Check Dams.

9) **Control Pollutants:** Stormwater runoff from the project area infiltrates to groundwater. Overland and/or groundwater flow is eventually tributary to Gierin Creek located approximately 0.5 miles downstream from the project site. Gierin Creek is not included on the Department of Ecology's Water Quality Assessment 303d list and according to the City of Sequim, no fish habitat has been identified within the Basin.

   Temporary protection of the disturbed soils provides the first level of protection for pollution control, and perimeter measures downstream will mitigate the remaining pollutants. The Contractor will be responsible for managing their construction equipment per DOE-approved BMPs. If a truck wheel wash is required, truck wheel wash water and concrete truck washout water shall be collected and discharged to the public sanitary sewer (SS) system or trucked off-site to an approved location for disposal. To apply for SS release, contact the local sewer purveyor for authorization.

   Structural source controls required are S411 – Landscaping and Lawn/Vegetation Management and S417 – Maintenance of Stormwater Drainage and Treatment Systems. These source controls from Volume IV of the 2019 DOE Manual are attached with this SWPPP narrative.

10) **Control De-Watering:** The majority of the earthwork on the project will be constructed during the dry season, and it is not anticipated that groundwater will be encountered in the excavations for this project. In the event that perched groundwater is encountered during construction, the Contractor shall route it to the sediment settling pond by pumping it out of the excavation.

11) **Maintain BMPs:** DOE-approved standard BMP maintenance will be required in accordance with erosion/sedimentation control notes on C1.1 of the project drawings.

12) **Manage the Project:** All phases of construction will be managed by the Contractor. The site must be stabilized and no soils will be allowed to remain exposed and unworked for more than two days between October 1st and April 30th and for more than seven days between May 1st and September 30th. The Contractor will provide maintenance and monitoring of TESC BMPs. Work of all contractors will be coordinated to minimize the duration of disturbance on the site. The best management practices shown on the TESC

plan are minimum requirements. Failure to maintain SWPPP measures in accordance with adopted standards may result in the work being performed at the County's direction and the costs assessed as a lien against the property where such facilities are located.

13) **Protect LID BMPs:** Protect finished landscaping surfaces. The proposed bioretention cell shall be protected and maintained per the 2012 LID Technical Guidance Manual for Puget Sound Appendix 4 (Tables I, V, and VI). During construction, the bioretention cell shall be adequately covered and protected from sedimentation, and fencing shall be placed around the cell to keep out any construction traffic.

2. Project Description

The proposed project involves the renovation of the existing library building and construction of two building additions located on the eastern and southern sides of the existing building. Additionally, the parking lot will be resurfaced with accompanying walkways and landscape areas. The total project parcel area is 83,635 square feet (1.92 acres).

The project proposes a total of 31,605 square feet (0.726 acres) of new plus replaced hard surface. Flow control and on-site stormwater management will be provided by an infiltrating bioretention cell. The cell is designed to fully infiltrate the tributary stormwater inflow, and will provide enhanced water quality treatment for pollution-generating surfaces. See the project's stormwater site plan for more information on the proposed drainage systems.

3. Existing Site Conditions

Within the project area there exists a paved western parking area, library building and eastern grass field. Between the library building and grass field is a gravel drive and several outbuildings. There is site access from N Sequim Ave into the paved parking area and from the bordering church parking lot into the gravel drive on the eastern side of the main library building.

The project is located within the Gierin Creek Drainage Basin. Drainage for the northern side of the existing parking area sheet flows northeast into a catch basin which connects to a dry well in the northeastern corner of the parking area. Drainage for the southern side of the parking area sheet flows southeast into a drywell in the southeastern corner of the parking area. Drainage from the existing building flows into a dry well via a pipe in the southeastern corner. After entering one of the three existing drywells water infiltrates into the soil below. Drainage from the field east of the existing building flows west to east, dispersing across the site and into the bordering fields before infiltrating into the soil.

4. Adjacent Areas

There is a church property bordering most of the northern side of the project area, with N Sequim Ave running parallel to the western side. The remaining northern, eastern, and southern sides of the project area are bordered by fields and pastures.

5. Critical Areas

The project site is located within a Critical Aquifer Recharge Area. There are no other environmental critical areas on-site.

Per Washington Department of Ecology flood hazard maps, the site is not within or in close proximity to a 100-year floodplain.

6. Soils

According to the Web Soil Survey by the USDA Natural Resources Conservation Service, the soils within the project area consist primarily of "Sequim Very Gravelly Sandy Loam", 0 to 1 percent slopes. A geotechnical report was prepared by Associated Earth Sciences, Inc., dated August 25, 2022. Five geotechnical borings were completed around the eastern and southern sides of the existing library building. The borings encountered a fill layer beginning at 0 feet and ranging from 3 to 5 feet below ground surface, consisting of brown, gravelly, silty, fine to medium sand. The soils observed below the fill layer were native alluvial soils consisting of gravelly sand and sandy gravel. No groundwater was encountered in any borings.

7. Potential Erosion Problem Areas

The site is not within an erosion hazard area, so there are not expected to be significant erosion problems. Per the proposed contract documents, the contractor is to provide protection for soils to limit the exposure to erosion. The limitation of disturbance, adequate cover practices, seasonal work limitation, and runoff control are the most effective methods for reduction of turbidity in stormwater runoff. Any runoff that does occur will be directed to the temporary sump and then pumped to the sediment settling pond. Areas that have not been permanently stabilized will be addressed using DOE-approved BMPs, per the construction documents.

8. Construction Phasing

At this time, it is not expected that the project will be formally phased. The contractor is responsible for coordinating work of all subcontractors to keep the duration of site disturbance limited to the maximum extent possible.

9. Construction Schedule

Construction is expected to begin in June 2023 and be completed by Spring 2024.

Construction is not expected to take place in the wet season, October 1st to April 30th. Should wet weather conditions occur during construction, the contractor shall implement the de-watering procedures outlined in this SWPPP and applicable BMPs including but not limited to C123, Plastic Covering; C121, Mulching; C122, Nets and Blankets; C126, Polyacrylamide for Soil Erosion Protection; C130, Surface Roughening.

10. Financial/Ownership Responsibilities

This property is owned and operated by the North Olympic Library System (NOLS). The accepted low bidder on the project will be responsible for posting a performance and payment bond with the North Olympic Library System, and thus will be the responsible party for liability associated with erosion and sedimentation impact.

11. Engineering Calculations

A copy of the calculations performed during design of the project and relevant storm drainage modeling discussions is included in the project's Stormwater Site Plan (drainage report).

12. Certified Erosion Control Specialist

The contractor will name their Certified Erosion Control Specialist and provide contact information at the pre-construction meeting.

LPD engineering pllc

APPENDIX D

Operations and Maintenance Manual

Sequim Branch Library
Expansion and Renovation

Operations & Maintenance Manual

May 3, 2023

Prepared by:

LPD Engineering, PLLC
1932 1st Avenue, Suite 201
Seattle, WA 98101
206.725.1211

Operations & Maintenance Manual

Project Overview

This Operations and Maintenance Manual is for the Sequim Branch Library expansion and renovation located at 630 N Sequim Avenue in Sequim, Washington. The proposed project involves the expansion of the existing library building. Other improvements include re-paving of the parking lot and the installation of gravel/paved walkways and landscape areas.

Stormwater System Overview

In the proposed conditions, stormwater runoff will generally be collected with swale or catch basins, and routed via piped conveyance system to the proposed infiltrating bioretention cell to be located east of the new library building addition. The bioretention cell will have an emergency overflow spillway that would disperse onto the open grass area east of the project area (within the library parcel).

Refer to Exhibit A – Stormwater Facilities Site Map (attached), and the drainage plan Sheet C2.0, included with this manual for a layout of the drainage system. Also refer to Sheet C5.0, for details of the proposed infiltrating bioretention area and other drainage infrastructure.

Infiltrating Bioretention Facility Maintenance

To manage water quality and provide flow control, an infiltrating bioretention facility will be provided east of the existing library building and proposed addition. Refer to the attached maintenance guidelines from Tables V-A.1, V-A.2 and V-A.21 from the 2019 DOE Stormwater Management Manual for Western Washington for detention ponds, infiltration facilities and bioretention facilities.

Catch Basin Maintenance

Catch basins and area drains will be provided for stormwater collection around the library building. Refer to the attached maintenance guidelines from Table V-A.5 from the 2019 DOE Stormwater Management Manual for Western Washington for catch basins.

Maintenance Responsibility

This Operations and Maintenance Manual shall be kept in the Sequim Branch Library main office, and a copy shall be kept at the North Olympic Library System office. This manual must be made readily available for inspection by City of Sequim personnel. North Olympic Library System is the responsible organization for maintenance of the on-site storm systems. The North Olympic Library System can be contacted at (360) 417-8500.

The maintenance activity log shall be kept up date with the most current O&M actions by the North Olympic Library System, and shall be made available for inspection by the City upon request.

Attachments:

- Exhibit A - Stormwater Facilities Site Map
- Drainage Plan Sheet C2.0
- Drainage Details Sheet C5.0
- Operation and Maintenance Guidelines from the 2019 Department of Ecology Stormwater Management Manual for Western Washington
- Sample Maintenance Activity Log

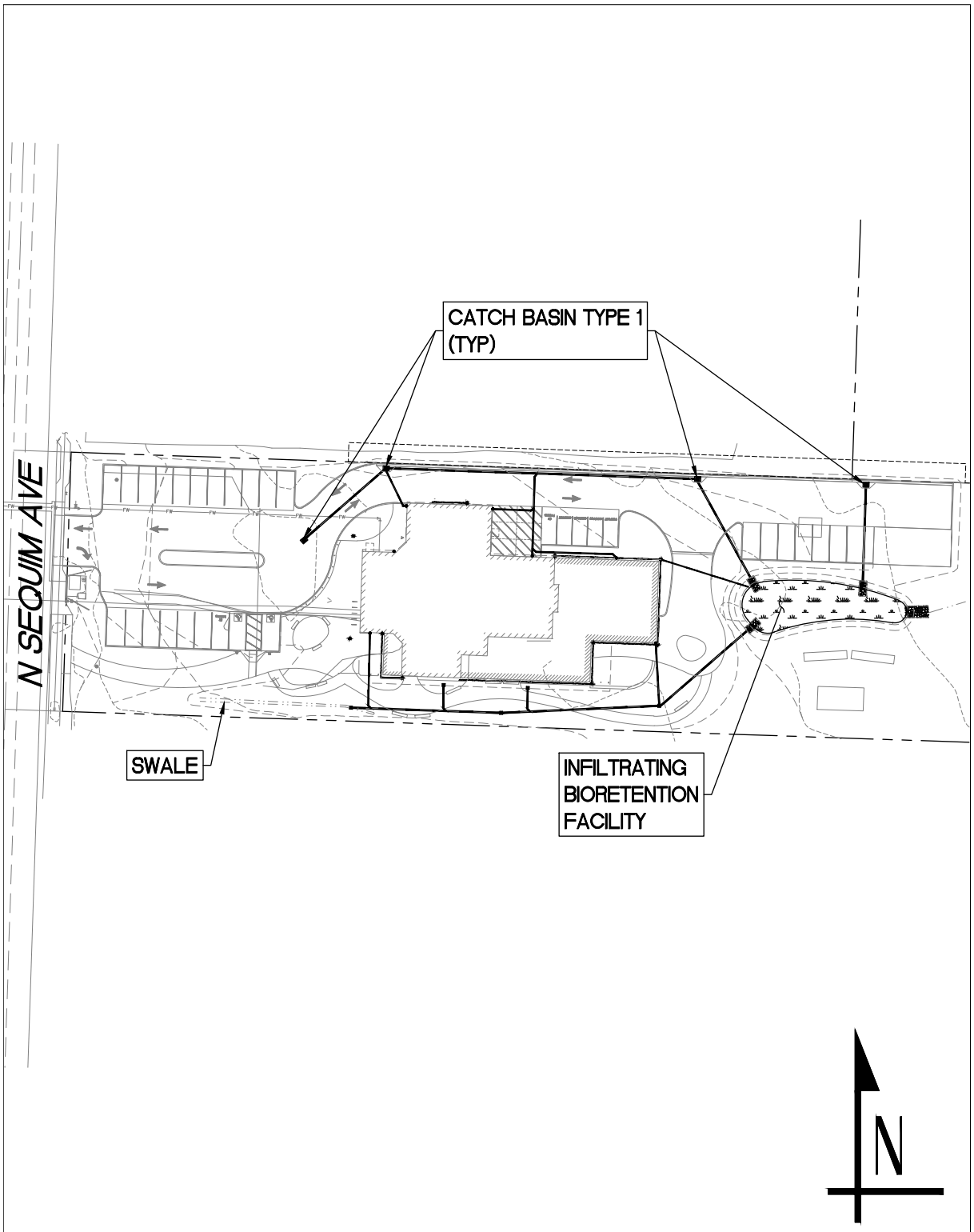
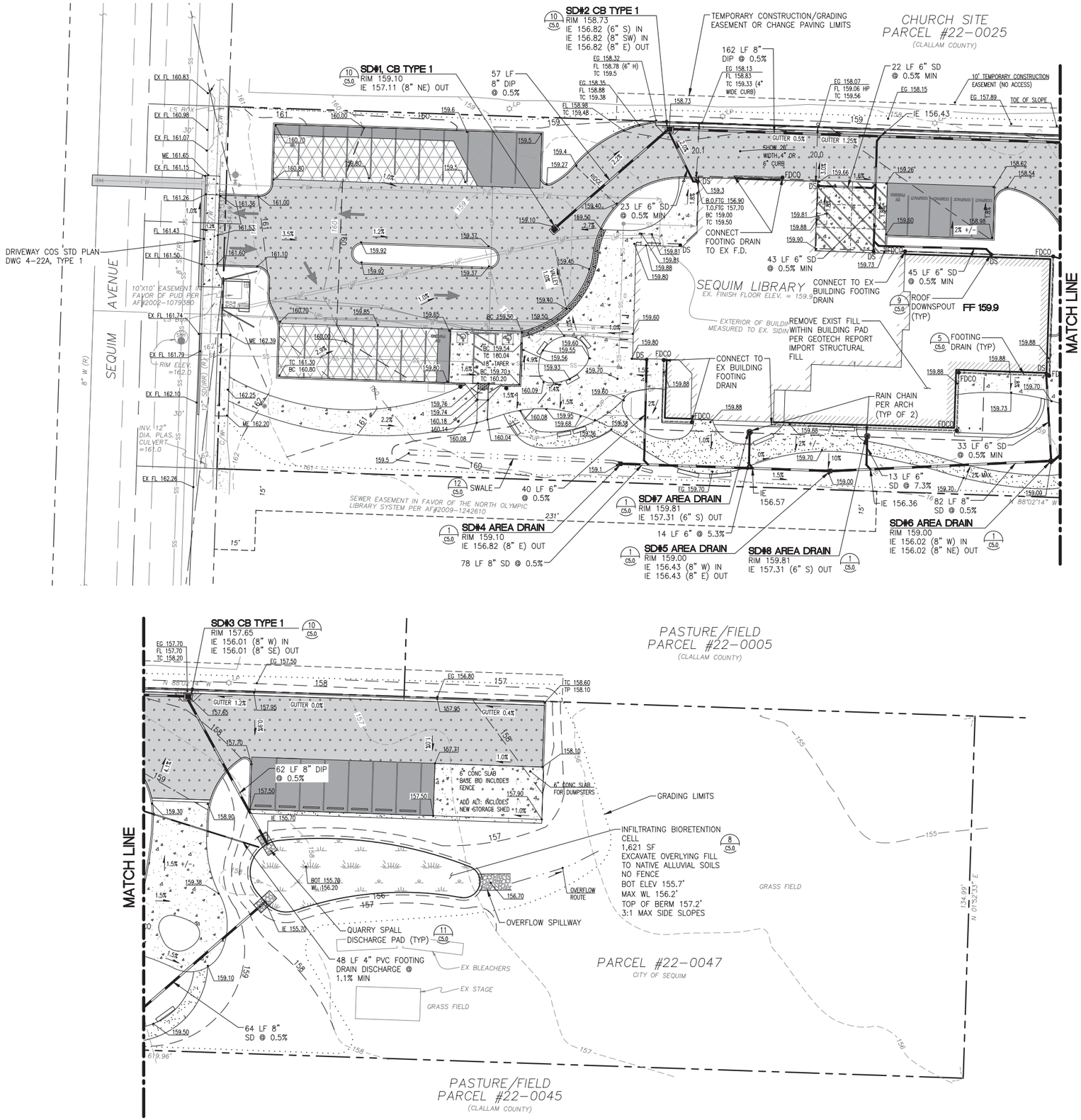


EXHIBIT A - STORMWATER FACILITIES SITE MAP
SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION





LEGEND

- PROPERTY LINE
- EX CONTOUR (INDEX)
- EX CONTOUR
- PROPOSED CONTOUR (INDEX)
- PROPOSED CONTOUR
- SPOT ELEVATION
- FF 78.0 FINISHED FLOOR ELEVATION
- EX BUILDING
- PROPOSED BUILDING
- CONCRETE PAVING PER LANDSCAPE
- CONCRETE PAVEMENT
- TACTILE WARNING STRIP
- LIGHT DUTY ASPHALT (AC) PAVEMENT
- HEAVY DUTY ASPHALT (AC) PAVEMENT
- GRIND & OVERLAY LIGHT DUTY ASPHALT PAVEMENT
- GRAVEL SURFACING PER LANDSCAPE
- VERTICAL CURB
- BIORETENTION CELL
- QUARRY SPALL DISCHARGE PAD
- AREA DRAIN
- CATCH BASIN TYPE 1
- STORM DRAINAGE PIPE
- FDCO FOOTING DRAIN CLEANOUT
- DS DOWNSPOUTS
- FOOTING/SUBSURFACE DRAIN
- FIRE HYDRANT
- WATER FITTINGS
- WATER SERVICE LINES
- WATER METER
- WATER SERVICE LINES
- FIRE SERVICE LINE
- FIRE SERVICE VAULT
- FIRE SERVICE CONNECTION
- SS SEWER LINES
- SEWER CLEANOUT
- RIDGE RIDGE LINE
- GRADING LIMITS

EARTHWORK	
CUT:	1,150 CY
FILL:	1,500 CY

QUANTITIES PROVIDED FOR PERMIT ONLY, AND SHALL NOT BE USED FOR BIDDING.

811 Know what's **below**. **Call** before you dig. Dial 811

SHKS ARCHITECTS
1050 N. 38th St.
Seattle, WA 98103
PH: 206.675.9151
www.shksarchitects.com

LPD engineering pllc
1932 First Ave
Suite 201
Seattle, WA 98101
p. 206.725.1211
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www.lpdengineering.com

MARC J. SERR STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER 5/3/23

NOLS
SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION

630 N SEQUIM AVE
SEQUIM, WA 98382

Drawn by:	KES
Checked:	MJS
Date:	5/3/23
Scale:	As indicated

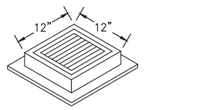
Revisions:

No.	Date	Remarks

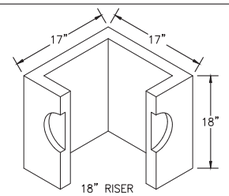
PERMIT DOCUMENTS

GRADING & DRAINAGE

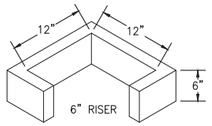
C2.0



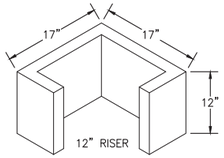
12" X 12" FRAME AND GRATE (SATHER MANUFACTURING 1212 FRAME AND GRATE OR APPROVED EQUAL)



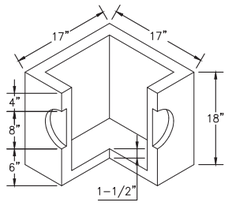
18" RISER



6" RISER



12" RISER

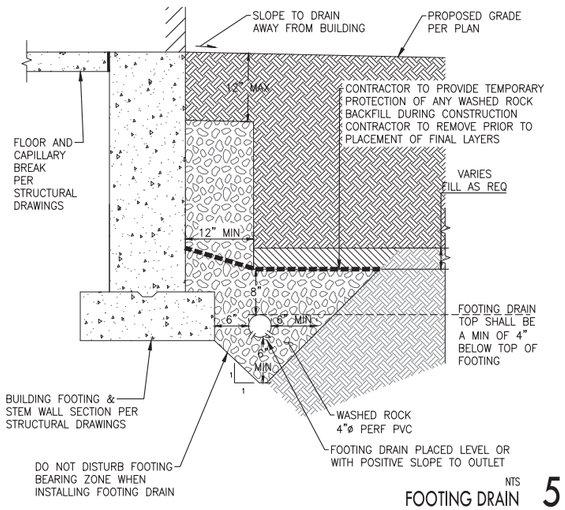


18" JUNCTION BOX

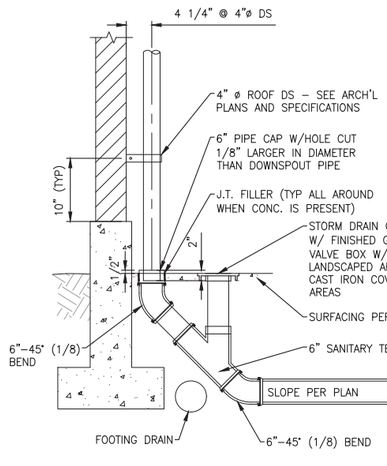
GRATES IN WALKWAYS, PLAZAS AND PEDESTRIAN AREAS MUST BE A.D.A. COMPLIANT
SEE WSDOT STD PLAN B–30.15–00.

17" X 17" AREA DRAIN BY CUZ CONCRETE PRODUCTS OR EQUAL

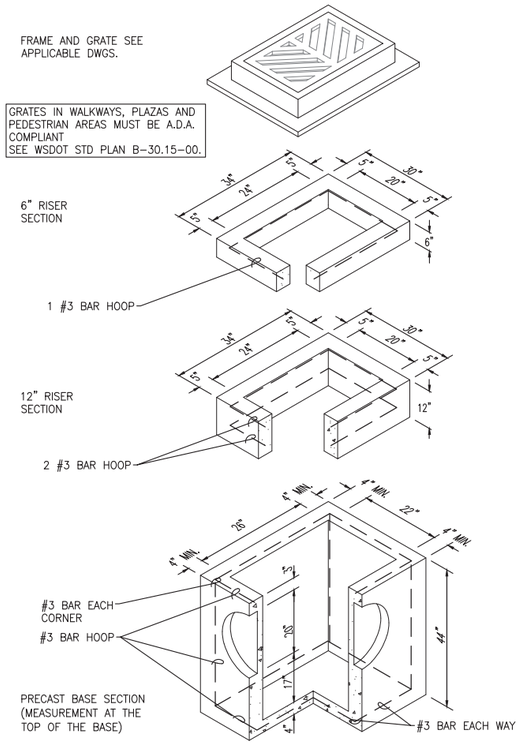
NTS
AREA DRAIN 1



NTS
FOOTING DRAIN 5



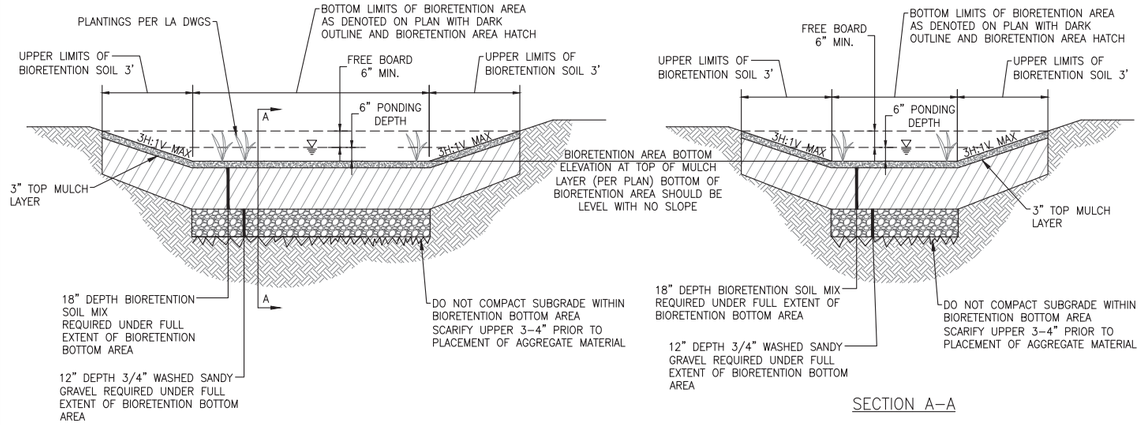
NTS
ROOF DOWNSPOUT 9



NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST–IN–PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIA. OF 20". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
6. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIA. PLUS CATCH BASIN WALL THICKNESS.
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'–0".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2"/FT.
9. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR–F–621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON–ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
11. FOR CATCH BASINS IN PARKING LOTS REFER TO WSDOT STD PLAN B–5.60–01.
12. EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.
13. CATCH BASIN INSTALLATION SHALL BE PER CONTRACT DOCUMENTS AND DETAILS.

NTS
CATCH BASIN TYPE 1 10

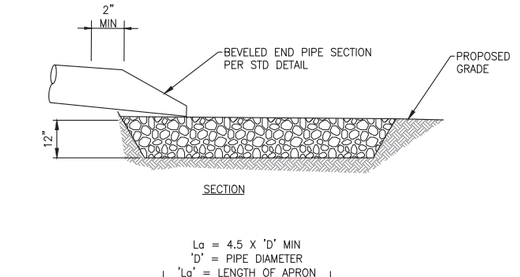


SECTION A–A

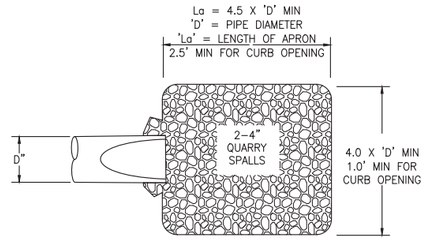
CONSTRUCTION SEQUENCE FOR BIORETENTION AREA

1. INSTALL TEMPORARY SEDIMENT CONTROL BMPS AS SHOWN ON PLAN.
2. COMPLETE SITE GRADING. PROVIDE PROTECTION SO THAT DRAINAGE IS PROHIBITED FROM ENTERING BIORETENTION CONSTRUCTION AREA.
3. SITE STABILIZATION TO BE COMPLETE PRIOR TO INSTALLATION OF BIORETENTION AREA. BIORETENTION AREAS THAT WERE USED AS TEMPORARY SEDIMENT TRAPS SHOULD BE EXCAVATED 6 INCHES BELOW THE BOTTOM OF THE SEDIMENT TRAP PRIOR TO CONSTRUCTION OF BIORETENTION AREA.
4. EXCAVATE BIORETENTION AREA TO PROPOSED DEPTH AND SCARIFY THE TOP 3"–4" OF EXISTING SOIL SURFACES. DO NOT COMPACT NATIVE SUBGRADE.
5. AFTER EXCAVATION, CONTRACTOR SHALL COORDINATE WITH GEOTECHNICAL ENGINEER, WHO SHALL VERIFY SUBGRADE INFILTRATION RATES USING FALLING HEAD PERCOLATION TEST METHOD, AS DESCRIBED IN APPENDIX III–A OF THE 2021 PIERCE COUNTY SWSDM. REPORT FINDINGS TO ENGINEER OF RECORD AND COUNTY INSPECTOR. THE SITE SOILS WERE FOUND TO BE HIGHLY INFILTRATIVE, BUT THE HIGHEST FIELD INFILTRATION RATE RECOGNIZED BY PIERCE COUNTY IS 60 INCHES PER HOUR. AFTER APPLYING THE APPROPRIATE CORRECTION FACTORS TO THE TESTING RESULTS, THE DESIGN INFILTRATION RATE USED IS 30 INCHES PER HOUR.
6. INSTALL PVC SLOTTED UNDERDRAIN PIPE PER PLAN.
7. BACKFILL BIORETENTION AREA WITH BIORETENTION SOIL MIX AND AGGREGATE MATERIAL. OVERFILLING IS RECOMMENDED TO ACCOUNT FOR SETTLEMENT. LIGHT HAND TAMPING IS ACCEPTABLE IF NECESSARY.
8. BIORETENTION SOIL MIX SHALL CONSIST OF THE FOLLOWING:
   - AGGREGATE TO COMPOST RATIO: 60% MINERAL AGGREGATE (WITH LESS THAN 5% FINES), 40% COMPOST (MEET REQUIREMENTS IN WAC 173–350–220)
   - TOTAL BIORETENTION SOIL MIX ORGANIC CONTENT SHALL BE 4–8% (BY DRY WEIGHT)
   - BIORETENTION SOIL DEPTH SHALL BE A MINIMUM OF 18–INCHES
   - SEE PLANTING SPECIFICATIONS SECTION 32 9000 FOR ADDITIONAL BIORETENTION SOIL REQUIREMENTS
9. PRESOAK THE PLANTING SOIL PRIOR TO PLANTING VEGETATION TO AID IN SETTLEMENT.
10. COMPLETE FINAL GRADING TO ACHIEVE PROPOSED DESIGN ELEVATIONS. LEAVE SPACE FOR UPPER LAYER OF MULCH AS SPECIFIED ON PLANS.
11. PLANT VEGETATION ACCORDING TO PLANTING PLAN.
12. MULCH AND INSTALL EROSION PROTECTION AT SURFACE FLOW ENTRANCES WHERE NECESSARY UNTIL ENTIRE SITE IS STABILIZED. MULCH MUST BE WOOD CHIPS CONSISTING OF SHREDDED OR CHIPPED HARDWOOD. MULCH SHOULD NOT CONTAIN WEED SEEDS, GRASS CLIPPINGS, AND LARGE CHUNKS OF BARK.
13. CONTRACTOR IS RESPONSIBLE FOR KEEPING BIORETENTION SOIL SEDIMENT FREE AFTER INSTALLATION AND UPON COMPETITION OF CONSTRUCTION, AND ANY SEDIMENT CONTAMINATED BIORETENTION SOIL SHALL BE REMOVED AND REPLACED AT THE CONTRACTORS EXPENSE.
14. POST–CONSTRUCTION, BIORETENTION SOIL MIX SHALL BE TESTED PER SECTION 3.4.7, VOLUME III OF PIERCE COUNTY STORMWATER AND SITE DEVELOPMENT MANUAL.

NTS
INFILTRATING BIORETENTION CELL 8

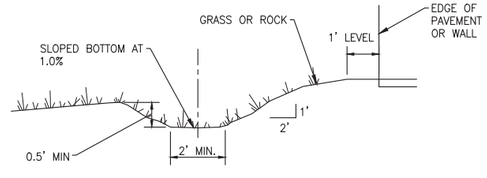


SECTION



PLAN

NTS
QUARRY SPALL DISCHARGE PAD 11



NOTES:

POSITIVE DRAINAGE TO CB OUTLET (SD#4)

NTS
SWALE 12

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PERMIT DOCUMENTS

DRAINAGE DETAILS

C5.0

Appendix V-A: BMP Maintenance Tables

Ecology intends the facility-specific maintenance standards contained in this section to be conditions for determining if maintenance actions are required as identified through inspection. Recognizing that Permittees have limited maintenance funds and time, Ecology does not require that a Permittee perform all these maintenance activities on all their stormwater BMPs. We leave the determination of importance of each maintenance activity and its priority within the stormwater program to the Permittee. We do expect, however, that sufficient maintenance will occur to ensure that the BMPs continue to operate as designed to protect ground and surface waters.

Ecology doesn't intend that these measures identify the facility's required condition at all times between inspections. In other words, exceedance of these conditions at any time between inspections and/or maintenance does not automatically constitute a violation of these standards. However, based upon inspection observations, the Permittee shall adjust inspection and maintenance schedules to minimize the length of time that a facility is in a condition that requires a maintenance action.

Table V-A.1: Maintenance Standards - Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance and inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g.,rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

Table V-A.2: Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		(A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Piping	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway	Rock Missing	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Table V-A.21: Maintenance Standards - Bioretention Facilities

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Facility Footprint				
Earthen side slopes and berms	B, S		Erosion (gullies/ rills) greater than 2 inches deep around inlets, outlet, and alongside slopes	• Eliminate cause of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control matting) • For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made. • Properly designed, constructed and established facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems persist, the following should be reassessed: (1) flow volumes from contributing areas and bioretention facility sizing; (2) flow velocities and gradients within the facility; and (3) flow dissipation and erosion protection strategies at the facility inlet.
	A		Erosion of sides causes slope to become a hazard	Take actions to eliminate the hazard and stabilize slopes
	A, S		Settlement greater than 3 inches (relative to undisturbed sections of berm)	Restore to design height
	A, S		Downstream face of berm wet, seeps or leaks evident	Plug any holes and compact berm (may require consultation with engineer, particularly for larger berms)
	A		Any evidence of rodent holes or water piping in berm	• Eradicate rodents (see "Pest control") • Fill holes and compact (may require consultation with engineer, particularly for larger berms)
Concrete sidewalls	A		Cracks or failure of concrete sidewalls	• Repair/ seal cracks • Replace if repair is insufficient
Rockery sidewalls	A		Rockery side walls are insecure	Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height)
Facility area		All maintenance visits (at least biannually)	Trash and debris present	Clean out trash and debris
Facility bottom area	A, S		Accumulated sediment to extent that infiltration rate is reduced (see "Ponded water") or surface storage capacity significantly impacted	• Remove excess sediment • Replace any vegetation damaged or destroyed by sediment accumulation and removal • Mulch newly planted vegetation • Identify and control the sediment source (if feasible) • If accumulated sediment is recurrent, consider adding presettlement or installing berms to create a forebay at the inlet
		During/after fall leaf drop	Accumulated leaves in facility	Remove leaves if there is a risk to clogging outlet structure or water flow is impeded
Low permeability check dams and weirs	A, S		Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir or orifice	Clear the blockage
	A, S		Erosion and/or undercutting present	Repair and take preventative measures to prevent future erosion and/or undercutting
	A		Grade board or top of weir damaged or not level	Restore to level position

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Ponded water	B, S		Excessive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.	Determine cause and resolve in the following order: 1. Confirm leaf or debris buildup in the bottom of the facility is not impeding infiltration. If necessary, remove leaf litter/debris. 2. Ensure that underdrain (if present) is not clogged. If necessary, clear underdrain. 3. Check for other water inputs (e.g., groundwater, illicit connections). 4. Verify that the facility is sized appropriately for the contributing area. Confirm that the contributing area has not increased. If steps #1-4 do not solve the problem, the bioretention soil is likely clogged by sediment accumulation at the surface or has become overly compacted. Dig a small hole to observe soil profile and identify compaction depth or clogging front to help determine the soil depth to be removed or otherwise rehabilitated (e.g., tilled). Consultation with an engineer is recommended.
Bioretention soil mix	As needed		Bioretention soil mix protection is needed when performing maintenance requiring entrance into the facility footprint	• Minimize all loading in the facility footprint (foot traffic and other loads) to the degree feasible in order to prevent compaction of bioretention soils. • Never drive equipment or apply heavy loads in facility footprint. • Because the risk of compaction is higher during saturated soil conditions, any type of loading in the cell (including foot traffic) should be minimized during wet conditions. • Consider measures to distribute loading if heavy foot traffic is required or equipment must be placed in facility. As an example, boards may be placed across soil to distribute loads and minimize compaction. • If compaction occurs, soil must be loosened or otherwise rehabilitated to original design state.
Inlets/Outlets/Pipes				
Splash block inlet	A		Water is not being directed properly to the facility and away from the inlet structure	Reconfigure/ repair blocks to direct water to facility and away from structure
Curb cut inlet/outlet	M during the wet season and before severe storm is forecasted	Weekly during fall leaf drop	Accumulated leaves at curb cuts	Clear leaves (particularly important for key inlets and low points along long, linear facilities)
Pipe inlet/outlet	A		Pipe is damaged	Repair/ replace
	W		Pipe is clogged	Remove roots or debris
	A, S		Sediment, debris, trash, or mulch reducing capacity of inlet/outlet	• Clear the blockage • Identify the source of the blockage and take actions to prevent future blockages
		Weekly during fall leaf drop	Accumulated leaves at inlets/outlets	Clear leaves (particularly important for key inlets and low points along long, linear facilities)
		A	Maintain access for inspections	• Clear vegetation (transplant vegetation when possible) within 1 foot of inlets and outlets, maintain access pathways • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Erosion control at inlet	A		Concentrated flows are causing erosion	Maintain a cover of rock or cobbles or other erosion protection measure (e.g., matting) to protect the ground where concentrated water enters the facility (e.g., a pipe, curb cut or swale)
Trash rack	S		Trash or other debris present on trash rack	Remove/dispose
	A		Bar screen damaged or missing	Repair/replace
Overflow	A, S		Capacity reduced by sediment or debris	Remove sediment or debris/dispose
Underdrain pipe	Clean pipe as needed	Clean orifice at least biannually (may need more frequent cleaning during wet season)	• Plant roots, sediment or debris reducing capacity of underdrain • Prolonged surface ponding (see "Ponded water"	• Jet clean or rotary cut debris/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Vegetation				
Facility bottom area and upland slope vegetation	Fall and Spring		Vegetation survival rate falls below 75% within first two years of establishment (unless project O&M manual or record drawing stipulates more or less than 75% survival rate).	• Determine cause of poor vegetation growth and correct condition • Replant as necessary to obtain 75% survival rate or greater. Refer to original planting plan, or approved jurisdictional species list for appropriate plant replacements (See Appendix 3 - Bioretention Plant List, in the *LID Technical Guidance Manual for Puget Sound*, (Hinman and Wulkan, 2012)). • Confirm that plant selection is appropriate for site growing conditions • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants
Vegetation (general)	As needed		Presence of diseased plants and plant material	• Remove any diseased plants or plant parts and dispose of in an approved location (e.g., commercial landfill) to avoid risk of spreading the disease to other plants • Disinfect gardening tools after pruning to prevent the spread of disease • See the *Pacific Northwest Plant Disease Management Handbook* (Pscheidt and Ocamb, 2016) for information on disease recognition and for additional resources • Replant as necessary according to recommendations provided for "facility bottom area and upland slope vegetation".
Trees and shrubs		All pruning seasons (timing varies by species)	Pruning as needed	• Prune trees and shrubs in a manner appropriate for each species. Pruning should be performed by landscape professionals familiar with proper pruning techniques • All pruning of mature trees should be performed by or under the direct guidance of an ISA certified arborist
	A		Large trees and shrubs interfere with operation of the facility or access for maintenance	• Prune trees and shrubs using most current ANSI A300 standards and ISA BMPs. • Remove trees and shrubs, if necessary.
	Fall and Spring		Standing dead vegetation is present	• Remove standing dead vegetation • Replace dead vegetation within 30 days of reported dead and dying plants (as practical depending on weather/planting season) • If vegetation replacement is not feasible within 30 days, and absence of vegetation may result in erosion problems, temporary erosion control measures should be put in place immediately. • Determine cause of dead vegetation and address issue, if possible

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
				• If specific plants have a high mortality rate, assess the cause and replace with appropriate species. Consultation with a landscape architect is recommended.
	Fall and Spring		Planting beneath mature trees	• When working around and below mature trees, follow the most current ANSI A300 standards and ISA BMPs to the extent practicable (e.g., take care to minimize any damage to tree roots and avoid compaction of soil). • Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases; such plantings should use mainly plants that come as bulbs, bare root or in 4-inch pots; plants should be in no larger than 1-gallon containers.
	Fall and Spring		Presence of or need for stakes and guys (tree growth, maturation, and support needs)	• Verify location of facility liners and underdrain (if any) prior to stake installation in order to prevent liner puncture or pipe damage • Monitor tree support systems: Repair and adjust as needed to provide support and prevent damage to tree. • Remove tree supports (stakes, guys, etc.) after one growing season or maximum of 1 year. • Backfill stake holes after removal.
Trees and shrubs adjacent to vehicle travel areas (or areas where visibility needs to be maintained)	A		Vegetation causes some visibility (line of sight) or driver safety issues	• Maintain appropriate height for sight clearance • When continued, regular pruning (more than one time/ growing season) is required to maintain visual sight lines for safety or clearance along a walk or drive, consider relocating the plant to a more appropriate location. • Remove or transplant if continual safety hazard • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants
Flowering plants		A	Dead or spent flowers present	Remove spent flowers (deadhead)
Perennials		Fall	Spent plants	Cut back dying or dead and fallen foliage and stems
Emergent vegetation		Spring	Vegetation compromises conveyance	Hand rake sedges and rushes with a small rake or fingers to remove dead foliage before new growth emerges in spring or earlier only if the foliage is blocking water flow (sedges and rushes do not respond well to pruning)
Ornamental grasses (perennial)		Winter and Spring	Dead material from previous year's growing cycle or dead collapsed foliage	• Leave dry foliage for winter interest • Hand rake with a small rake or fingers to remove dead foliage back to within several inches from the soil before new growth emerges in spring or earlier if the foliage collapses and is blocking water flow
Ornamental grasses (evergreen)		Fall and Spring	Dead growth present in spring	• Hand rake with a small rake or fingers to remove dead growth before new growth emerges in spring • Clean, rake, and comb grasses when they become too tall • Cut back to ground or thin every 2-3 years as needed
Noxious weeds		M (March - October, preceding seed dispersal)	Listed noxious vegetation is present (refer to current county noxious weed list)	• By law, class A & B noxious weeds must be removed, bagged and disposed as garbage immediately • Reasonable attempts must be made to remove and dispose of class C noxious weeds • It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality; use of herbicides and pesticides may be prohibited in some jurisdictions • Apply mulch after weed removal (see "Mulch")
Weeds		M (March - October,	Weeds are present	• Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
		preceding seed dispersal)		appropriate • Follow IPM protocols for weed management (see "Additional Maintenance Resources" section for more information on IPM protocols)
Excessive vegetation		Once in early to mid- May and once in early- to mid-September	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil	• Edge or trim groundcovers and shrubs at facility edge • Avoid mechanical blade-type edger and do not use edger or trimmer within 2 feet of tree trunks • While some clippings can be left in the facility to replenish organic material in the soil, excessive leaf litter can cause surface soil clogging
	As needed		Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety	• Determine whether pruning or other routine maintenance is adequate to maintain proper plant density and aesthetics • Determine if planting type should be replaced to avoid ongoing maintenance issues (an aggressive grower under perfect growing conditions should be transplanted to a location where it will not impact flow) • Remove plants that are weak, broken or not true to form; replace in-kind • Thin grass or plants impacting facility function without leaving visual holes or bare soil areas • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants
	As needed		Vegetation blocking curb cuts, causing excessive sediment buildup and flow bypass	Remove vegetation and sediment buildup
Mulch				
Mulch		Following weeding	Bare spots (without mulch cover) are present or mulch depth less than 2 inches	• Supplement mulch with hand tools to a depth of 2 to 3 inches • Replenish mulch per O&M manual. Often coarse compost is used in the bottom of the facility and arborist wood chips are used on side slopes and rim (above typical water levels) • Keep all mulch away from woody stems
Watering				
Irrigation system (if any)		Based on manufacturer's instructions	Irrigation system present	Follow manufacturer's instructions for O&M
	A		Sprinklers or drip irrigation not directed/located to properly water plants	Redirect sprinklers or move drip irrigation to desired areas
Summer watering (first year)		Once every 1-2 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in first year of establishment period	• 10 to 15 gallons per tree • 3 to 5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist • Use soaker hoses or spot water with a shower type wand when irrigation system is not present ◦ Pulse water to enhance soil absorption, when feasible

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
				◦ Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by several more passes. With this method , each pass increases soil absorption and allows more water to infiltrate prior to runoff • Add a tree bag or slow-release watering device (e.g., bucket with a perforated bottom) for watering newly installed trees when irrigation system is not present
Summer watering (second and third years)		Once every 2-4 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in second or third year of establishment period	• 10 to 15 gallons per tree • 3 to 5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist • Use soaker hoses or spot water with a shower type wand when irrigation system is not present ◦ Pulse water to enhance soil absorption, when feasible ◦ Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by several more passes. With this method , each pass increases soil absorption and allows more water to infiltrate prior to runoff
Summer watering (after establishment)		As needed	Established vegetation (after 3 years)	• Plants are typically selected to be drought tolerant and not require regular watering after establishment; however, trees may take up to 5 years of watering to become fully established • Identify trigger mechanisms for drought-stress (e.g., leaf wilt, leaf senescence, etc.) of different species and water immediately after initial signs of stress appear • Water during drought conditions or more often if necessary to maintain plant cover
Pest Control				
Mosquitoes	B, S		Standing water remains for more than 3 days after the end of a storm	• Identify the cause of the standing water and take appropriate actions to address the problem (see "Ponded water") • To facilitate maintenance, manually remove standing water and direct to the storm drainage system (if runoff is from non pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces) after getting approval from sanitary sewer authority. • Use of pesticides or *Bacillus thuringiensis israelensis* (Bti) may be considered only as a temporary measure while addressing the standing water cause. If overflow to a surface water will occur within 2 weeks after pesticide use, apply for coverage under the Aquatic Mosquito Control NPDES General Permit.
Nuisance animals	As needed		Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces	• Reduce site conditions that attract nuisance species where possible (e.g., plant shrubs and tall grasses to reduce open areas for geese, etc.) • Place predator decoys • Follow IPM protocols for specific nuisance animal issues (see "Additional Maintenance Resources" section for more information on IPM protocols) • Remove pet waste regularly • For public and right-of-way sites consider adding garbage cans with dog bags for picking up pet waste.
Insect pests	Every site visit associated with		Signs of pests, such as wilting leaves, chewed leaves and bark, spotting or other indicators	• Reduce hiding places for pests by removing diseased and dead plants • For infestations, follow IPM protocols (see "Additional Maintenance Resources" section for more information on IPM

Table V-A.21: Maintenance Standards - Bioretention Facilities (continued)

Maintenance Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
	vegetation management			protocols)

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

[a] Frequency: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season (for debris/clog related maintenance, this inspection/maintenance visit should occur in the early fall, after deciduous trees have lost their leaves); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

IPM - Integrated Pest Management

ISA - International Society of Arboriculture

Table V-A.22: Maintenance Standards - Permeable Pavement

Component	Recommended Frequency [a]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course				
Permeable Pavements, all	A, S		Runoff from adjacent pervious areas deposits soil, mulch or sediment on paving	• Clean deposited soil or other materials from permeable pavement or other adjacent surfacing • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place) • Mulch and/or plant all exposed soils that may erode to pavement surface
Porous asphalt or pervious concrete		A or B	None (routine maintenance)	Clean surface debris from pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: ◦ Walk-behind vacuum (sidewalks) ◦ High efficiency regenerative air or vacuum sweeper (roadways, parking lots) ◦ ShopVac or brush brooms (small areas) • Hand held pressure washer or power washer with rotating brushes Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.
	A_b		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or combination of the following methods:

Maintenance Activity Log

To be completed by maintenance staff and provided to the City of Sequim upon request.

Property Name/Owner:	Site Address:
Property Manager/Contact:	Phone:
Facility Type:	Location on Property:
Requirement met by Facility (circle all that apply): On-site Stormwater Management Treatment/Water Quality Flow Control	

Date	Reason for Inspection/Action (circle one)	Condition Observed	Action Taken	Initials
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			
	Complaint or Problem Regular Maintenance			

LPD engineering pllc

APPENDIX E

Geotechnical Report

1) Subsurface Report
2) Pavement Section Report
3) Soils Infiltration Memo

associated
earth sciences
incorporated



Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

Sequim, Washington

Prepared For

NORTH OLYMPIC LIBRARY SYSTEM

August 25, 2022
Project No. 20220259E001



Associated Earth Sciences, Inc.

www.aesgeo.com

Kirkland | Mount Vernon | Tacoma

associated earth sciences incorporated

August 25, 2022
Project No. 20220259E001

North Olympic Library System
2210 South Peabody Street
Port Angeles, Washington 98362

Attention: Brian Phillips

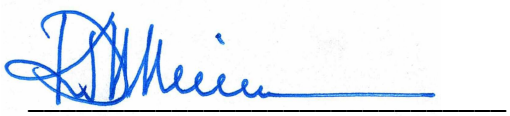
Subject: Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report
Sequim Branch Library Expansion and Renovation
630 North Sequim Avenue
Sequim, Washington

Dear Mr. Phillips:

We are pleased to present this copy of our geotechnical engineering report for the referenced project. This report summarizes the results of our subsurface exploration, geologic hazard, and geotechnical engineering evaluation, and offers recommendations for the design and development of the proposed project. Project plans were in the conceptual phase at the time this report was prepared. We recommend that we be allowed to review the recommendations contained in this report and modify them, if necessary, once project plans have been finalized.

We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. If you should have any questions, or if we can be of additional help to you, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington



Kurt D. Merriman
Senior Principal Geotechnical Engineer

KDM/ld - 20220259E001-002

SUBSURFACE EXPLORATION, GEOLOGIC HAZARD, AND GEOTECHNICAL ENGINEERING REPORT

SEQUIM BRANCH LIBRARY EXPANSION AND RENOVATION

Sequim, Washington

Prepared for:
North Olympic Library System
2210 South Peabody Street
Port Angeles, Washington 98362

Prepared by:
Associated Earth Sciences, Inc.
911 Fifth Avenue
Kirkland, Washington 98033
425-827-7701

August 25, 2022
Project No. 20220259E001

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report presents the results of our subsurface exploration, geologic hazard, and geotechnical engineering evaluation for the proposed project. The project site location is shown on the "Vicinity Map," Figure 1. The approximate location of our explorations completed for this study are shown on Figure 2, "Existing Site and Exploration Plan." The logs of the subsurface explorations are included in Appendix A, and laboratory test results are included in Appendix B.

1.1 Purpose and Scope

The purpose of this study was to provide geotechnical engineering design recommendations to be utilized in the design of the project. This study included a review of selected available geologic literature, completing five exploration borings, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and shallow groundwater at the site. Geotechnical engineering studies were completed to formulate recommendations for site preparation, temporary cut slopes, erosion control, structural fill, foundations, seismic site class, floor slabs, site drainage, and pavements. This report summarizes our fieldwork and offers geotechnical engineering recommendations based on our present understanding of the project. We recommend that we be allowed to review the recommendations presented in this report and revise them, if needed, once project plans are finalized.

1.2 Authorization

Authorization to proceed with this study was granted by means of a signed copy of our scope of work and cost proposal dated July 14, 2022. This report has been prepared for the exclusive use of the North Olympic Library System and its agents for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

The subject site is the existing Sequim Branch Library (Clallam County Parcel Number 033020-220047-0000) located at 630 North Sequim Avenue in Sequim, Washington. We understand the library was constructed in 1983, and the existing building is approximately 6,000 square feet in

area and situated on a 620-foot by 135-foot rectangular parcel. The property is bordered to the south and east by agricultural land, to the north by an existing church and asphalt parking lot, and to the west by North Sequim Avenue. The site is occupied by the existing library building, located near the center of the parcel. An asphalt parking lot occupies the western half of the parcel and a paved drive lane exists along the southern border of the property. The eastern portion of the property is occupied by a gravel parking lot and two small accessory buildings.

The topography at the site and surrounding area generally slopes down gently to the east. Overall vertical relief within the vicinity of the library building is estimated at about 1 to 2 feet except for a few landscape areas that slope up against the exterior walls of the building.

Based on our review of the conceptual site plan, we understand that the proposed development will involve an expansion of the library building to the south and east with expansion of the parking area to the northeast. We understand the building expansion will consist of at-grade single-story structures.

3.0 SUBSURFACE EXPLORATION

Our field study included advancing five exploration borings (EB-1 through EB-5) at the site. Our exploration borings are generally located in the vicinity of the proposed building expansion and new parking lot area. The locations of our exploration borings were coordinated with the project architect, SHKS Architects, and are shown on Figure 2. The conclusions and recommendations presented in this report are based on the conditions encountered in these explorations. The number, locations, and depths of our explorations were completed within site and budgetary constraints. Copies of the exploration logs completed for this study are included in Appendix A.

Because of the nature of exploratory work below ground, extrapolation of subsurface conditions between field explorations is necessary. It should be noted that subsurface conditions between the explorations may differ from those inferred by the boring data due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations may not become fully evident until construction. If variations are observed at that time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Borings

The exploration borings were performed by Holt Services, Inc., an independent firm working under subcontract to Associated Earth Sciences, Inc. (AESI). The borings were completed by advancing a 6-inch outside-diameter core barrel with a rotosonic track-mounted drill rig. The

borings were continuously observed and logged by a representative of AESI. During the drilling process, samples were obtained at 5-foot-depth intervals. The boring logs presented in Appendix A are based on the field logs, drilling action, and inspection of the samples secured.

During the rotosonic drilling process, disturbed but representative samples were obtained by using the Standard Penetration Test (SPT) procedure in accordance with *ASTM International* (ASTM) D-1586. This test and sampling method consists of driving a standard, 2-inch outside-diameter, split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer, free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded, and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. If a total of 50 blows is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are plotted on the attached boring logs. In addition to the SPT samples, grab samples were taken from each 5-foot-long rotosonic core run.

Samples obtained from the split-barrel sampler and the rotosonic cores were classified in the field and representative portions placed in watertight containers. The samples were then transported to AESI's laboratory for further visual classification and laboratory testing, as necessary.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, visual reconnaissance of the site, and review of selected applicable geologic literature. The following section presents detailed subsurface information organized from the shallowest (youngest) to the deepest (oldest) sediment types.

4.1 Stratigraphy

Asphalt

A surficial layer of asphalt was encountered within explorations EB-4 and EB-5, located at the southeast loading area and southern drive lane, respectively. The existing asphalt had a measured thickness of approximately 4 inches at both locations.

Crushed Rock Aggregate and Gravel

Directly beneath the asphalt in EB-4 and EB-5, our explorations encountered a thin layer of crushed rock aggregate approximately 2 inches in thickness. Directly below the ground surface at explorations EB-1 through EB-3, we encountered a surficial layer of gravel approximately 6 inches in thickness. The crushed rock aggregate and gravel were placed to support pavements and vehicle traffic.

Fill

Fill soils (those not naturally placed) were encountered directly below the asphalt pavement and surficial gravel layer at all exploration locations. The fill generally consisted of loose to medium dense, dry to moist, grayish brown to dark brown with minor oxidation staining, silty sand with variable gravel content ranging to sandy gravel with variable silt content. Some of the fill also contained scattered organics (rootlets), cemented angular gravel (possibly crushed recycled concrete), and occasional cobbles. The fill extended to depths ranging from about 3 to 5 feet below the existing ground surface. Due to the typically loose composition and inherent variability of the fill and unknown placement and compaction methods, the fill soils are not considered suitable for direct foundation support and may require remedial measures for support of new pavements, hardscapes, and slabs-on-grade.

Older Alluvium

Directly underlying the fill at all exploration locations, we encountered older alluvial (river-deposited) sediments to the termination depth of each boring (ranging from about 11.5 to 26.5 feet). The older alluvium generally consisted of slightly moist to moist, tan to brown, gravelly sand to sandy gravel with variable silt content. We interpret these sediments to be representative of alluvial floodplain terrace deposits associated with the ancestral Dungeness River. The SPT N-values suggest some of the soils encountered are in a dense or very dense state; however, these N-values are overstated due to the presence of gravel within the sampler. Since these soils were deposited in an alluvial setting, it is our opinion that the majority of the alluvial soils encountered are in a medium dense state. The alluvial sediments are suitable for shallow foundation support with proper preparation.

4.2 Regional Geologic and Soils Mapping

We reviewed the regional geologic map of the project area (*Geologic Map of the Sequim 7.5-minute Quadrangle, Clallam County*, *Washington,* by H.W. Schasse, and R.L. Logan, Washington Division of Geology and Earth Resources, Open File Report 98-7, scale 1:24,000 [1998]), which indicates the site is underlain by “Older Alluvium” and generally comprised of flood plain

terrace deposits of the ancestral Dungeness River. Our interpretation of the sediments encountered in our explorations is in general agreement with the regional geologic map.

Review of the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS), now referred to as Natural Resources Conservation Service (NRCS), *Web Soil Survey* indicates that the subject site is underlain by Sequim very gravelly sandy loam. Sequim very gravelly sandy loam is derived from alluvium according to the NRCS description. Our interpretation of the sediments encountered in our explorations is in general agreement with the regional soils map.

4.3 Hydrology

No groundwater was encountered in any of the borings at the time of drilling in late July; however, groundwater is expected deeper below the site as the area is known to be within an extensive aquifer system associated with the Dungeness River as described by the United States Geological Survey (USGS) (Thomas et al., 1999). In addition, a comprehensive summary of regional and local groundwater studies is included in a report by Pacific Groundwater Group (PGG) titled "2008 Dungeness Groundwater Flow Model, Design, Construction, Calibration and Results" prepared for Clallam County, dated February 19, 2009.

The USGS and PGG studies describe the regional hydrogeology as a layered system of laterally extensive aquifers and aquitards consisting of a "shallow aquifer" underlain by a fine-grained "upper confining bed," a confined "middle aquifer," a "lower confining bed," a "lower aquifer" and deeper undifferentiated sediments. Over most of the Dungeness peninsula, all or some of these hydrostratigraphic units overlie Tertiary bedrock of sedimentary and volcanic origin. The total thickness of the unconsolidated sediments beneath the peninsula ranges from zero feet in the south to as much as 2,500 feet in the northeast.

The referenced "shallow aquifer" includes the ancestral Dungeness River alluvium that underlies the site. The thickness of the shallow aquifer generally ranges from 50 to 200 feet, although greater and smaller thicknesses have been observed. The aquifer is generally unconfined but can exhibit some local confinement with the occurrence of fine-grained, low-permeability deposits. Regional potentiometric maps show a north to northwesterly flow direction in the shallow aquifer (Thomas et al., 1999 and PGG, 2009) downvalley toward the Strait of Juan de Fuca and slightly westerly toward the Dungeness River.

Although groundwater was not encountered during our exploration, it should be noted that the occurrence and level of groundwater seepage below the site may vary in response to such factors as changes in season, amounts of precipitation, changes in site use, and other on- and off-site factors.

4.4 Laboratory Testing

We performed three grain-size analyses on representative soil samples obtained from the existing fill and older alluvium layers within exploration EB-3 to support soil classification in the field. The grain-size analyses test results are summarized in Table 1 below (and attached in Appendix B) with soil descriptions based on the ASTM D-2487 Unified Soil Classification System (USCS).

Table 1
Summary of Grain-Size Analyses

Exploration Boring No.	Sample Depth (feet)	Geologic Unit	USCS Soil Description	Fines Content (%)
EB-3	2	Fill	Very sandy GRAVEL, some silt (GW-GM)	5.2
	7	Older Alluvium	Very gravelly SAND, some silt (SW-SM)	5.9
	22	Older Alluvium	Very sandy GRAVEL, trace silt (GP)	3.7

USCS = Unified Soil Classification System
% = percent of total weight passing the U.S. No. 200 Sieve

II. GEOLOGIC HAZARDS AND MITIGATIONS

The following discussion of potential geologic hazards is based on the geologic, slope, and ground and surface water conditions, as observed and discussed herein. The discussion will be limited to landslide, seismic, and erosion hazards. Individual geologic hazard topics are discussed in further detail below.

5.0 LANDSLIDE HAZARDS AND MITIGATIONS

The topography at the site and surrounding area generally slopes down gently to the east. Overall vertical relief within the vicinity of the library building is estimated at about 1 to 2 feet except for a few landscape areas that slope up against the exterior walls of the building. It is our opinion that the risk of damage to the proposed library expansion by landsliding is low and that no mitigation measures are warranted for the project due to the lack of steep slopes at the project site and vicinity and the presence of medium dense alluvial sediments at shallow depths. No detailed assessment of slope stability was prepared as part of this report and none is warranted, in our opinion.

6.0 SEISMIC HAZARDS AND MITIGATIONS

The following discussion is a general assessment of seismic hazards that is intended to be useful to the project design team in terms of understanding seismic issues, and to the structural engineer for design.

All of Western Washington is at risk of strong seismic events resulting from movement of the tectonic plates associated with the Cascadia Subduction Zone (CSZ), where the offshore Juan de Fuca plate subducts beneath the continental North American plate. The site lies within a zone of strong potential shaking from subduction zone earthquakes associated with the CSZ. The CSZ can produce earthquakes up to magnitude 9.0, and the recurrence interval is estimated to be on the order of 500 years. Geologists infer the most recent subduction zone earthquake occurred in 1700 (Goldfinger et al., 2012 [1]). Three main types of earthquakes are typically associated with subduction zone environments: crustal, intraplate, and interplate earthquakes. Seismic records in the Puget Sound region document a distinct zone of shallow crustal seismicity (e.g., the Seattle Fault Zone [SFZ]). These shallow fault zones may include surficial

[1] Goldfinger, C., Nelson, C.H., Morey, A.E., Johnson, J.E., Patton, J.R., Karabanov, E., Gutierrez-Pastor, J., Eriksson, A.T., Gracia, E., Dunhill, G., Enkin, R.J, Dallimore, A., and Vallier, T., 2012, *Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone*: U.S. Geological Survey Professional Paper 1661–F, 170.

expressions of previous seismic events, such as fault scarps, displaced shorelines, and shallow bedrock exposures. The shallow fault zones typically extend from the surface to depths ranging from 16 to 19 miles. A deeper zone of seismicity is associated with the subducting Juan de Fuca plate. Subduction zone seismic events produce intraplate earthquakes at depths ranging from 25 to 45 miles beneath the Puget Lowland including the 1949, 7.2-magnitude event; the 1965, 6.5-magnitude event; and the 2001, 6.8-magnitude event) and interplate earthquakes at shallow depths near the Washington coast including the 1700 earthquake, which had a magnitude of approximately 9.0. The 1949 earthquake appears to have been the largest in this region during recorded history and was centered in the Olympia area. Evaluation of earthquake return rates indicates that an earthquake of the magnitude between 5.5 and 6.0 is likely within a given 20-year period.

Generally, there are four types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture, 2) seismically induced landslides or lateral spreading, 3) liquefaction, and 4) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

6.1 Surficial Ground Rupture

The nearest suspected fault trace to the project site is the Sequim Fault located approximately 2 miles south of the site. Recent geologic mapping suggests this fault may be the westward extension of the Little River, Lake Creek-Boundary Creek Fault system located south of Port Angeles, Washington. Studies of the Little River, Lake Creek-Boundary Creek Fault system by the USGS are ongoing and include *Map and Data for Quaternary Faults and Folds in Washington State* (Open-File Report 03-428) by Lidke et al., 2003, *Geologic Map of the Port Angeles and Ediz Hook Quadrangles, Clallum County, Washington* (Open File Report 2004-13) by Schasse et al., 2004, and *Field and Laboratory Data from an Earthquake History Study of the Scarps of the Lake Creek-Boundary Creek Fault Between the Elwha River and Siebert Creek, Clallum County, Washington* (Scientific Investigations Map 2691) by Alan R. Nelson et al., 2007.

There is evidence suggesting portions of the Littler River Fault have had up to 1.3 meters of displacement in the late Holocene epoch. The evidence generally includes geographic and geomorphic surface features (scarps), and stratigraphic offsets and observed deformational features (folds) in outcrop and in trenches excavated by the USGS across the fault traces. Radiocarbon ages on fragments of wood charcoal from two scarp-derived wedges of sediment suggest two surface faulting features between 2,000 and 600 years ago. Other radiocarbon dating performed on similar sediments in association with these faults suggests a possible earlier surface faulting earthquake less than 5,000 years ago.

Though no specific recurrence interval for earthquakes associated with these faults has been indicated, the referenced documents seem to suggest the earthquakes have occurred in excess

of every 1,000 years. No ground surface displacements associated with the faults described above had been documented to date on the subject site. Given the inferred long recurrence interval and the distance from the faults described above, the risk of surficial ground rupture at the subject site associated with the Little River Fault, Lake Creek-Boundary Creek Fault, and Sequim Fault is considered to be low during the expected life of the proposed structures.

6.2 Seismically Induced Landslides

Similar to the discussion in Section 5.0, "Landslide Hazards and Mitigations," it is our opinion that the potential risk of damage to the proposed improvements by seismically induced slope failures is low and that no mitigation measures are warranted for the project due to the lack of steep slopes in the immediate project area.

6.3 Liquefaction

Liquefaction is a process through which unconsolidated soil loses strength as a result of vibrations, such as those which occur during a seismic event. During normal conditions, the weight of the soil is supported by both grain-to-grain contacts and by the fluid pressure within the pore spaces of the soil below the water table. Extreme vibratory shaking can disrupt the grain-to-grain contact, increase the pore pressure, and result in a temporary decrease in soil shear strength. The soil is said to be liquefied when nearly all of the weight of the soil is supported by pore pressure alone. Liquefaction can result in deformation of the sediment and settlement of overlying structures. Areas most susceptible to liquefaction include those areas underlain by very soft to stiff, non-cohesive silt and very loose to medium dense, non-silty to silty sands with low relative densities, accompanied by a shallow water table.

In our opinion, the potential risk of damage to the proposed structures by liquefaction is low due to the high gravel content within the older alluvium and the absence of adverse shallow groundwater conditions below the site.

6.4 Ground Motion

It is our opinion that earthquake damage to the proposed structures, when founded on suitable bearing stratum in accordance with the recommendations contained herein, will likely be caused by the intensity and acceleration associated with the event. We understand that structural design of the building additions will follow the 2018 *International Building Code* (IBC) standards. Based on the subsurface conditions encountered within our exploration borings, we recommend using Site Class "D" as defined in Table 20.3-1 of American Society of Civil Engineers (ASCE) 7-16 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*.

7.0 EROSION HAZARDS AND MITIGATIONS

The *Sequim Municipal Code* (SMC) Section 18.80.030 defines Erosion Hazard Areas as the following:

"Erosion hazard areas" means those areas containing soils which, according to the USDA NRCS Soil Classification System, may experience severe to very severe erosion. Erosion hazard areas also include coastal erosion-prone areas and channel migration zones.

Review of the USDA NRCS *Web Soil Survey* indicates that the soil present at the subject site is Sequim very gravelly sandy loam. The USDA NRCS identifies the Sequim very gravelly sandy loam erosion hazard risk as "slight." Our explorations encountered shallow soils that resemble Sequim Series soils. The topography of the site is relatively flat to very gently sloping. Based on these conditions, it is our opinion that the site would not classify as an Erosion Hazard Area under the SMC.

Although the site does not classify as an Erosion Hazard Area, the near-surface fill soils underlying the site generally consist of silty fine sand. These sediments will be susceptible to erosion and off-site sediment transport when exposed during construction. Therefore, the project should follow best management practices (BMPs) to mitigate erosion hazards and potential for off-site sediment transport. To mitigate the potential for off-site sediment transport, we recommend the following:

1. Silt fencing should be placed around the lower perimeter of ground disturbance area(s). The fencing should be periodically inspected and maintained as necessary to ensure proper function.

2. To the extent possible, earthwork-related construction should proceed during the drier periods of the year and disturbed areas should be revegetated as soon as possible. Temporary erosion control measures should be maintained until permanent erosion control measures are established.

3. Areas stripped of vegetation during construction should be mulched and hydroseeded, replanted as soon as possible, or otherwise protected. During winter construction, hydroseeded areas should be covered with clear plastic to facilitate grass growth.

4. If excavated soils are to be stockpiled on the site for reuse, measures should be taken to reduce the potential for erosion from the stockpile. These could include, but are not limited to, covering the pile with plastic sheeting, the use of low stockpiles in flat areas, and the use of straw bales/silt fences around pile perimeters.

5. Interceptor swales with rock check dams should be constructed to divert stormwater from construction areas and to route collected stormwater to an appropriate discharge location.

6. A rock construction entrance should be provided to reduce the amount of sediment transported offsite on truck tires.

7. All stormwater from impermeable surfaces, including driveways and roofs, should be tightlined into approved facilities and not be directed onto or above steeply sloping areas.

It is our opinion that with the proper implementation of the temporary erosion and sedimentation control (TESC) plans and by field-adjusting appropriate erosion mitigation measures (BMPs) throughout construction, the potential adverse impacts from erosion hazards on the project may be mitigated.

III. DESIGN RECOMMENDATIONS

8.0 INTRODUCTION

Our exploration indicates that, from a geotechnical standpoint, the subject site is feasible for the proposed development provided the recommendations contained herein are properly followed. At the locations explored, we encountered a surficial horizon of existing fill ranging in thickness from about 3 to 5 feet, underlain by native alluvial soils consisting of gravelly sand and sandy gravel. The native alluvial soils will provide suitable support for conventional spread and strip footings. The existing fill soils are not considered suitable for direct foundation support and may require remedial measures for support of new pavements and floor slabs.

The following sections provide our recommendations for site preparation, temporary and permanent slopes, structural fill, foundation support, drainage considerations, slab-on-grade support, and pavement design.

9.0 SITE PREPARATION

Site preparation should include removal of all existing pavements, topsoil, and any other deleterious materials located within the footprint of the proposed improvements. Where any existing loose fill or natural sediments are relatively free of organics and near their optimum moisture content for compaction, they can be segregated and considered for reuse as structural fill. Existing underground utilities should either be removed or relocated if they are located below the planned building additions. Erosion and surface water control should be established around the perimeter of the site to satisfy City of Sequim requirements.

After stripping, planned excavation, and any required overexcavation have been performed, the resulting surface should be proof-rolled with a fully loaded dump truck or other suitable equipment. Any soft, loose, or yielding areas should be excavated to expose suitable bearing soils. The subgrade should then be compacted to a firm and unyielding condition as determined by the geotechnical engineer. Structural fill can then be placed to achieve desired grades, if needed.

9.1 Subgrade Protection

The on-site soils generally contain relatively minor quantities of fine-grained material (silt and clay) and are not considered highly moisture-sensitive. However, isolated areas of the subject site may contain higher quantities of fine-grained material and will be subject to disturbance when wet. The contractor must use care during site preparation and excavation operations so

that the underlying soils are not softened. If disturbance occurs the softened soils should be removed, and the area brought to grade with structural fill.

9.2 Temporary and Permanent Cut Slopes

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction. For estimating purposes, however, we anticipate that temporary, unsupported cut slopes in unsaturated existing fill and native alluvial soils can be made at a maximum slope of 1.5H:1V (Horizontal:Vertical) or flatter. As is typical with earthwork operations, some sloughing and raveling may occur, and cut slopes may have to be adjusted in the field. If groundwater seepage is encountered in cut slopes, or if surface water is not routed away from temporary cut slope faces, flatter slopes will be required. In addition, WISHA/OSHA regulations should be followed at all times.

Permanent cut and structural fill slopes that are not intended to be exposed to surface water should be designed at inclinations of 2H:1V or flatter. All permanent cut or fill slopes should be compacted to at least 95 percent of the modified Proctor maximum dry density, as determined by ASTM D-1557, and the slopes should be protected from erosion by sheet plastic until vegetation cover can be established during favorable weather.

10.0 STRUCTURAL FILL

Placement of structural fill may be necessary to establish desired grades in some areas or to backfill utility trenches or around foundations. All references to structural fill in this report refer to subgrade preparation, fill type, and placement and compaction of materials as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

The on-site soils contained minor quantities of fine-grained material and moisture contents near or below optimum for proper compaction and are generally considered suitable for use as structural fill with proper preparation. Depending on the time of year, weather conditions, and depth of excavation, these sediments may require the addition of water or aeration (drying) before use as structural fill.

Construction equipment traversing the site can cause considerable disturbance. If fill is placed during wet weather or if proper compaction cannot be attained, a select import material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction.

10.1 Subgrade Compaction

After overexcavation/stripping has been performed to the satisfaction of the geotechnical engineer/engineering geologist, the upper 12 inches of exposed ground should be recompacted to a firm and unyielding condition. If the subgrade contains too much moisture, adequate recompaction may be difficult or impossible to obtain and should probably not be attempted. In lieu of recompaction, the area to receive fill should be blanketed with washed rock or quarry spalls to act as a capillary break between the new fill and the wet subgrade. Where the exposed ground remains soft and further overexcavation is impractical, placement of an engineering stabilization fabric may be necessary to prevent contamination of the free-draining layer by silt migration from below.

10.2 Structural Fill Compaction

After stripping and subgrade preparation of the exposed ground is approved, or a free-draining rock course is laid, structural fill may be placed to attain desired grades. Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 8-inch loose lifts, with each lift being compacted to at least 95 percent of the modified Proctor maximum dry density using ASTM D-1557 as the standard. Utility trench backfill should be placed and compacted in accordance with applicable municipal codes and standards. The top of the compacted fill should extend horizontally a minimum distance of 3 feet beyond footings or pavement edges before sloping down at an angle no steeper than 2H:1V. Fill slopes should either be overbuilt and trimmed back to final grade or surface-compacted to the specified density.

10.3 Moisture-Sensitive Fill

Soils in which the amount of fine-grained material (smaller than No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. Use of moisture-sensitive soil in structural fills should be limited to favorable dry weather conditions. Most of the on-site sediments appear to contain a minor percentage (about 5 percent) of fine-grained material and are not considered highly moisture-sensitive.

11.0 FOUNDATIONS

No structural or architectural plans were available at the time of this report; however, we anticipate that the proposed building additions will be supported on conventional strip footings with slab-on-grade floors. Our exploration borings encountered existing fill soils that are not considered suitable for direct foundation support. We recommend either extending the bottom

of the footings to the native alluvial soils (ranging from about 3 to 5 feet below existing grade, but may vary) or removing the existing fill beneath the footing areas and replacing with structural fill, compacted crushed rock, or a lean grout (referred to as a foundation trench in this report). Foundation trenches should extend laterally beyond all foundation elements by at least 1 foot, and should have a minimum width of 4 feet. All foundation trenches should be excavated down to expose the underlying native sediments. Because of the potential for caving, the actual trench width may be greater than specified. We recommend backfilling the foundation trenches as the excavation proceeds to reduce caving. In order to reduce disturbance of the bearing soils exposed in the foundation trench, we recommend using a smooth-edge bucket.

Where the removal of existing fill for new foundations will occur adjacent to and below existing foundations, the excavation of existing fill should occur in a series of alternating 4-foot-long slot cuts to avoid undermining the existing foundation. Once the first series of slot cuts are excavated to bearing soils, they should be backfilled with controlled density fill (CDF) the same day they were excavated. Once the CDF has cured, excavation of the remaining areas can begin. Excavations below existing foundations should not remain open overnight.

For footings bearing directly on the native alluvial sediments or on structural fill placed over these sediments, a maximum allowable soil bearing pressure of 2,500 pounds per square foot (psf) may be used for design purposes, including both dead and live loads. An increase of one-third may be used for short-term wind or seismic loading. All footings should have a minimum width of 16 inches. Perimeter footings for the proposed buildings should be buried a minimum of 18 inches into the surrounding soil for frost protection. No minimum burial depth is required for interior footings; however, all footings must penetrate to the prescribed stratum, and no footings should be founded in or above loose, organic, existing fill soils or loose native sediments.

It should be noted that the area bounded by lines extending downward at 1H:1V from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM D-1557. In addition, a 1.5H:1V line extending down from any footing must not daylight because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edge of steps or cuts in the bearing soils.

Anticipated settlement of footings founded as recommended should be less than 1 inch with differential settlements at about one-half of the anticipated total settlement. Most of this movement should occur during initial dead load applications. However, disturbed material not removed from footing trenches prior to footing placement could result in increased settlements. All footing areas should be inspected by AESI prior to placing concrete to verify that the design bearing capacity of the soils has been attained and that construction conforms

with the recommendations contained in this report. Such inspections may be required by the governing municipality. Perimeter footing drains should be provided, as discussed under the "Drainage Considerations" section of this report.

11.1 Passive Resistance and Friction Factor

Lateral loads can be resisted by friction between the foundation and the native alluvial soils or supporting structural fill soils, and by passive earth pressure acting on the buried portions of the foundations. The foundations must be backfilled with structural fill and compacted to at least 95 percent of the maximum dry density to achieve the passive resistance provided below. We recommend the following allowable design parameters which include a factor of safety of 1.5:

- Passive equivalent fluid = 300 pounds per cubic foot (pcf)
- Coefficient of friction = 0.30

12.0 FLOOR SUPPORT

Floor slabs can be supported directly on the native alluvial soils, on new structural fill placed above native sediments, or on a minimum of 2 feet of new structural fill where thicker existing fill soils are encountered.

Interior slabs where control of moisture migration through the slab is needed should be cast atop a minimum of 4 inches of clean washed crushed rock or pea gravel to act as a capillary break. Areas of subgrade that are disturbed (loosened) during construction should be compacted to a non-yielding condition prior to placement of capillary break material. It should also be protected from dampness by an impervious moisture barrier at least 10 mils thick. The impervious barrier should be placed between the capillary break material and the concrete slab.

13.0 LATERAL EARTH PRESSURES FOR BELOW-GRADE WALLS

Horizontally backfilled walls, which are free to yield laterally at least 0.1 percent of their height, may be designed to resist lateral earth pressures represented by an "active" equivalent fluid equal to 35 pcf. Fully restrained, horizontally backfilled, rigid walls that cannot yield should be designed for an "at-rest" equivalent fluid of 55 pcf. Walls with sloping backfill up to a maximum gradient of 2H:1V should be designed using an equivalent fluid of 55 pcf for yielding conditions or 80 pcf for fully-restrained conditions. If parking areas are adjacent to walls, a surcharge of 250 psf should be added to the wall height in determining lateral design forces.

The lateral pressures presented above are based on the conditions of a uniform backfill consisting of excavated on-site soils or imported structural fill compacted to 95 percent of ASTM D-1557. Surcharge loading from adjacent footings or heavy construction equipment must be added to the above values. Perimeter footing drains should be provided for all retaining walls, as discussed under the "Drainage Considerations" section of this report.

13.1 Seismic Surcharge

As required by the 2018 IBC, retaining wall design should include a seismic surcharge pressure in addition to the equivalent fluid pressures presented above. Considering the site soils and the recommended wall backfill materials, we recommend a seismic surcharge pressure of 10H and 13H psf, where H is the wall height in feet for the "active" and "at-rest" loading conditions, respectively. The seismic surcharge should be modeled as a rectangular distribution with the resultant applied at the midpoint of the walls.

14.0 DRAINAGE CONSIDERATIONS

Footing drains on Existing building. Assume to add.

All retaining and perimeter footing wa vided with a drain at the footing elevation. The drains should consist ed, polyvinyl chloride (PVC) pipe surrounded by washed gravel. The lev ations in the pipe should be set approximately 2 inches below the botton nd the drains should be constructed with sufficient gradient to allow gravity discharge away from the structures. All retaining walls should be lined with a minimum, 12-inch-thick, washed gravel blanket provided to within 1 foot of finish grade, and which ties into the footing drain. Roof and surface runoff should not discharge into the footing drain system, but should be handled by a separate, rigid, tightline drain.

Exterior grades adjacent to walls should be sloped downward away from the additions to achieve surface drainage. Final exterior grades should promote free and positive drainage away from the buildings at all times. Water must not be allowed to pond or to collect adjacent to the foundation or within the immediate building areas. It is recommended that a gradient of at least 3 percent for a minimum distance of 10 feet from the building perimeter be provided, except in paved locations. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structures. Additionally, pavement subgrades should be crowned to provide drainage toward catch basins and pavement edges.

15.0 PAVEMENT RECOMMENDATIONS

The pavement sections included in this report section are for driveway and parking areas onsite and are not applicable to right-of-way improvements. At this time, we are not aware of any planned right-of-way improvements; however, if any new paving of public streets is required, we should be allowed to offer situation-specific recommendations.

New pavement areas should be prepared in accordance with the "Site Preparation" section of this report. Soft or yielding areas should be overexcavated to provide a suitable subgrade and backfilled with structural fill.

New pavements onsite may include areas subject only to light traffic loads from passenger vehicles, and may also include areas subject to heavier loading from vehicles that may include fire trucks, delivery trucks, and garbage trucks. In light traffic areas, we recommend a pavement section consisting of 3 inches of hot-mix asphalt (HMA) underlain by 4 inches of crushed surfacing base course (CSBC). In heavy traffic areas, we recommend a minimum pavement section consisting of 4 inches of HMA underlain by 6 inches of CSBC. The crushed rock base course must be compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557). All paving materials should meet the gradation criteria contained in the current Washington State Department of Transportation (WSDOT) Standard Specifications.

16.0 STORMWATER INFILTRATION FEASIBILITY

The feasibility of stormwater infiltration depends upon the presence of a suitable native receptor soil of sufficient thickness, extent, permeability, and vertical separation from groundwater. We anticipate that the native alluvial sediments consisting of gravelly sand to sandy gravel with relatively minor quantities of silt would be suitable receptor soils for shallow infiltration facilities provided there is adequate vertical separation from seasonal high groundwater.

Infiltration design for this project would require additional exploration and testing, well installation, and groundwater monitoring during the wet winter months to estimate the seasonal high groundwater level at the site and to estimate the design infiltration rate within the native alluvial soils. We are available to discuss stormwater management strategies and to develop a scope of work to provide additional subsurface information necessary for design upon request.

17.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

We recommend that AESI perform a geotechnical review of the plans prior to final design completion. In this way, we can confirm that our earthwork and foundation recommendations have been properly interpreted and implemented in the design.

We are also available to provide geotechnical engineering services during construction. Construction monitoring services are not part of this current scope of work. If these services are desired, please let us know, and we will prepare a cost proposal.

We have enjoyed working with you on this study and are confident that these recommendations will aid in the successful completion of your project. If you should have any questions or require further assistance, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

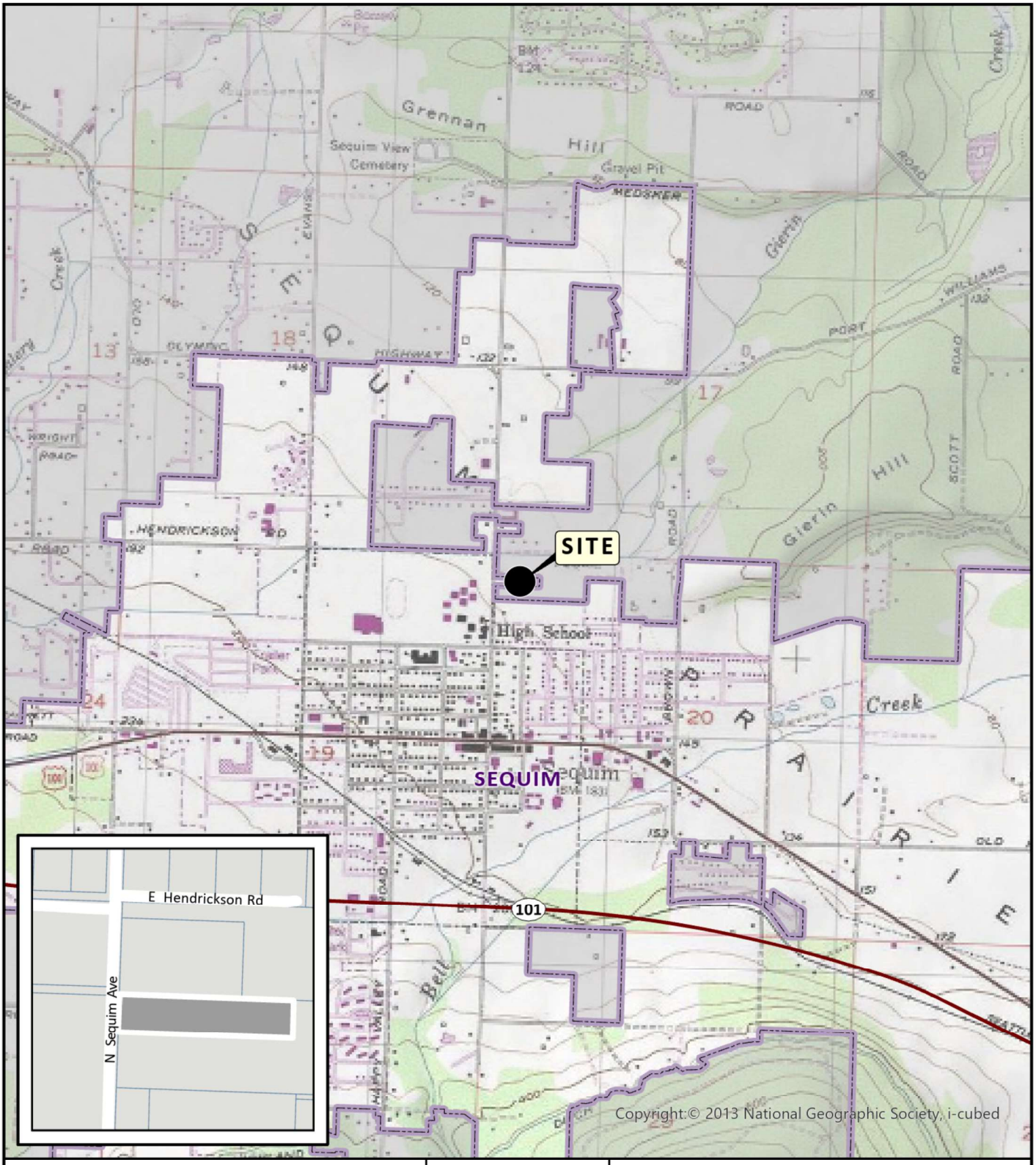
Brendan C. Young, L.G.
Senior Staff Geologist

G. Bradford Drew, P.E.
Senior Engineer



Kurt D. Merriman, P.E.
Senior Principal Engineer

Attachments:
Figure 1: Vicinity Map
Figure 2: Existing Site and Exploration Plan
Appendix A: Exploration Logs
Appendix B: Laboratory Test Results





DATA SOURCES / REFERENCES:
USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NATIONAL GEOGRAPHIC SOCIETY 2013
CLALLAM CO: STREETS, PARCELS 12/20, CITY LIMITS 7/22
LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

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NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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VICINITY MAP

SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION
SEQUIM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20220259E001	7/22	1

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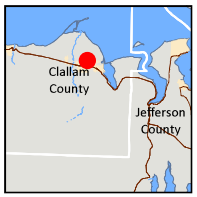


LEGEND

- SITE
- EXPLORATION BORING
- PARCEL
- CITY BOUNDARY
- CONTOUR 10 FT
- CONTOUR 2 FT

DATA SOURCES / REFERENCES:
USGS: OLYMPIC PENINSULA, WASHINGTON 3DEP LIDAR - AREA 1, FLOWN 9/17 - 4/19, CONTOURS FROM LIDAR
CLALLAM CO: PARCELS, STREETS, ZONING 7/22
AERIAL: BING IMAGERY 7/20

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE



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EXISTING SITE AND EXPLORATION PLAN

SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION
SEQUIM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
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APPENDIX A

Exploration Logs

Coarse-Grained Soils - More than 50% [1] Retained on No. 200 Sieve	Gravels - More than 50% [1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines [5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥12% Fines [5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50% [1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines [5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥12% Fines [5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50% [1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT [2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50
	Consistency	**SPT [2] blows/foot**
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

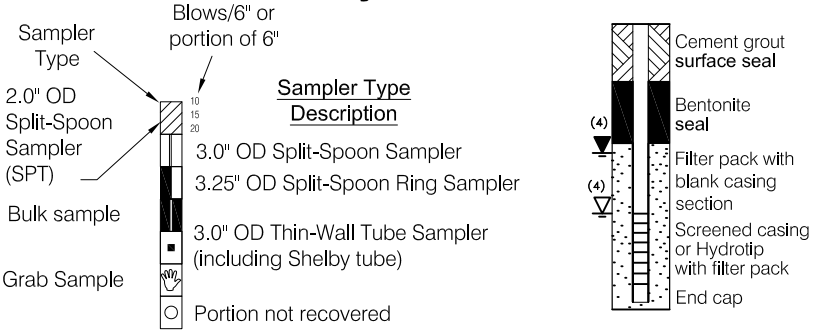
[3] Estimated Percentage

Component	Percentage by Weight
Trace	<5
Some	5 to <12
Modifier (silty, sandy, gravelly)	12 to <30
Very *modifier* (silty, sandy, gravelly)	30 to <50

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols



(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
▼ ATD = At time of drilling
▽ Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 12%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

blocks \ dwg \ log_key.dwg LAYOUT: Layout 4 -2014 Qty Chng

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Exploration Boring — EB-1

Sequim Branch Library Expansion and Renovation — Sheet: 1 of 1

Sequim, WA	Start Date: 7/25/22	Logged By: BCY
20220259E001	Ending Date: 7/25/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 11.5
Ground Surface Elevation (ft): 158
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
0		1			**Gravel - 6 inches**		2 2 3	5	
					Fill Slightly moist, dark brown, silty, fine SAND, some gravel; scattered organics (rootlets) (SM).				
2.5		2			Slightly moist to dry, brown to gray brown, gravelly, silty, SAND, some cobbles (≈4" nominal diameter) (SM).				
5		4			**Alluvium** Dry to slightly moist, brown mixed with gray and occasional inclusion of dark brown, silty, fine to medium SAND, some gravel; broken gravel in spoon; blow counts may be overstated (SM).		7 28 27	55	
7.5		5			Moist, brown, fine to medium SAND, some gravel, some silt; occasional beds (6 inches thick) of gray, silty, sand, some gravel; gravel (typically 3 inches or less); occasional cobbles (SP-SM).				
		6			Moist, brown, gravelly, medium SAND, some silt; some gravel have red coloration (SP-SM).				
10		7			Moist to slightly moist, grayish brown, gravelly, fine to medium SAND, trace to some silt; broken gravel in spoon; blow counts may be overstated (SP-SM/SP).		11 18 42	60	
					No groundwater encountered.				
12.5									
15									
17.5									

8/24/2022

20220259E001

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Exploration Boring — EB-2

Sequim Branch Library Expansion and Renovation — Sheet: 1 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
0		1			**Gravel - 6 inches**		3 8 14	22	
					Fill Slightly moist to moist, dark brown, silty, fine SAND, some gravel; poor recovery (SM).				
		2			Moist, brown to dark brown, gravelly, fine to medium SAND, some silt (SP-SM).				
2.5									
		3			Dry to slightly moist, tan to gray, gravelly, silty, fine SAND; gravel and rocks are angular and partially cemented (SM).				
5		4			**Alluvium** Dry to slightly moist, gray transitioning to brown, gravelly, fine to medium SAND, some silt; broken gravel in spoon; blow counts overstated (SP-SM).		23 38 32	70	
		5			Moist, brown, gravelly, fine to medium SAND, some silt (SP-SM).				
7.5									
		6			Moist, gray to brown, silty, gravelly, fine to medium SAND; layer (2 inches thick) of dry, sandy, silt (SM)				
10		7			Slightly moist, tan to gray, gravelly, fine to medium SAND, trace to some silt; minor broken gravel in spoon; blow counts may be overstated (SP/SP-SM).		3 18 27	45	
		8			Moist, brown, gravelly, medium SAND, trace silt; interbedded (6 to 12 inches thick) beds Slightly moist to moist, grayish brown, gravelly, fine SAND, some silt (SP).				
12.5									
		9							
15		10			Slightly moist, brown and gray, gravelly, fine to medium SAND, trace to some silt; layers of gray, siltier, fine sand; broken gravel in spoon; blow counts overstated (SP/SP-SM).		5 10 43	53	
		11			Moist, brown, gravelly, silty, fine to medium SAND (SM).				
17.5									

8/24/2022

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Exploration Boring — EB-2

Sequim Branch Library Expansion and Renovation — Sheet: 2 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
					Contractor casing hole in order to proceed.				
20		12			Slightly moist, grayish brown, fine SAND, some gravel, trace silt (SP).		18 50/5"	50/5"	
22.5		13			Slightly moist to moist, grayish brown, gravelly, fine to medium SAND, trace to some silt; occasional boulder to large cobble (greater than 6 inches) (SP/ SP-SM).				
25		14			Slightly moist, brownish gray to gray, gravelly, fine to medium SAND, trace to some silt (SP-SM).		22 24 22	46	
					No groundwater encountered.				
27.5									
30									
32.5									
35									
37.5									

8/24/2022

20220259E001

associated earth sciences incorporated

Exploration Boring — EB-3

Sequim Branch Library Expansion and Renovation — Sheet: 1 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
0					**Gravel - 6 inches**				
		1			**Fill** Slightly moist, dark brown with some gray, silty, gravelly, fine SAND (SM).		9 9 11	20	
		2			Slightly moist, brown, very sandy, GRAVEL, some silt, some inclusions of dark brown, silty, fine to medium SAND, some gravel (up to 5 inches) as lenses (GW-GM).				
2.5									
		3			Dry, gray, gravelly, silty, fine SAND; angular gravel and some cementing (recycled concrete ?) (SM) .			50/6"	
5		4			**Alluvium** Slightly moist, grayish brown to brown, gravelly, fine to medium SAND, some silt (SP-SM).		29 50/6"		
		5			Moist, brown, very gravelly (commonly 2 inches in diameter), fine to coarse SAND, some silt (SW-SM).				
7.5									
		6			Moist, gray brown, fine to coarse but predominantly medium SAND, some gravel, trace to some silt; zones from 7 to 10 feet range to very gravelly (SP/SP-SM).			50/6"	
10		7			Slightly moist to moist, grayish brown, fine to medium SAND, some gravel, trace to some silt (SP SM).		9 41 50/6"		
		8			Slightly moist, brown, gravelly, silty, fine SAND; gravel (up to 3 inches thick) (SM).				
12.5									
		9			Slightly moist to moist, brown, gravelly, fine to medium SAND, trace silt; occasional interbed of grayish brown, gravelly, silty, fine SAND (SP). Hole collapsed from 12 to 15 feet. Contractor adds casing.				
15		10			Very moist, brownish gray, gravelly, silty, fine to medium SAND; sand size increases with depth; excess moisture from driller adding water (SM).		26 35 49	84	
		11			Very moist, brownish gray, very sandy, GRAVEL, some cobbles (up to 5 inches), some silt (GW-GM).				
17.5									
		12			Moist, brown, gravelly, fine to predominantly medium SAND, trace silt (SP).				

8/24/2022

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Exploration Boring EB-3

Sequim Branch Library Expansion and Renovation — Sheet: 2 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
20		13			Moist, brown, gravelly, predominantly fine SAND, some silt; blow counts overstated; broken gravel in tip of spoon (SP-SM).		17 50/5"	50/5"	
		14			Moist, brown, sandy, gravel (up to 4 inches in diameter), some silt (GW-GM).				
22.5		15			Moist, brown, very sandy, GRAVEL, trace silt (GP).				
25		16			Moist to slightly moist, grayish brown, gravelly, fine to medium SAND, trace silt (SP).		5 15 36	51	
					No groundwater encountered.				
27.5									
30									
32.5									
35									
37.5									

8/24/2022

20220259E001

associated earth sciences incorporated

Exploration Boring — EB-4

Sequim Branch Library Expansion and Renovation — Sheet: 1 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
0		1			**Asphalt - 4 inches**		8	20	
					Crushed Aggregate - 2 inches		8		
					Fill		12		
		2			Moist, brown to dark brown with minor orange oxidation staining, gravelly, silty, fine to medium SAND (SM). Run 1: 0 to 5 feet				
2.5					Moist to very moist, dark brown, gravelly, silty, fine to medium SAND (SM).				
		3			**Alluvium** Moist, brown, gravelly, fine to medium SAND, some silt (SP-SM).				
5		4			Moist, brown, gravelly, fine to medium SAND, some silt; broken gravel in spoon; blow counts may be overstated (SP-SM).		25	74	
							32		
							42		
7.5		5			Moist, brown, fine to medium sandy, GRAVEL (commonly 1 to 2 inches; occasionally up to 4 inches), some silt (GP-GM).				
10		6			As above; broken gravel in spoon; blow counts overstated; poor recovery (GP-GM).		10	50/5"	
							50/5"		
		7			Slightly moist, brown, gravelly, fine to medium SAND, trace silt (SP).				
12.5									
15		8			Slightly moist, grayish brown to brown, medium SAND, some gravel, trace silt (SP).		38	83	
							37		
							46		
		9			Run 4: 15 to 20 feet				
17.5					Moist, brown, fine to medium SAND, some gravel, trace silt (SP).				
		10			Moist, brown, fine to medium SAND, some gravel, some silt (SP-SM).				

8/24/2022

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associated earth sciences incorporated

Exploration Boring — EB-4

Sequim Branch Library Expansion and Renovation — Sheet: 2 of 2

Sequim, WA	Start Date: 7/26/22	Logged By: BCY
20220259E001	Ending Date: 7/26/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 159
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
20		11			Moist, brown, gravelly, fine to medium SAND, trace silt; broken gravel in spoon; blow counts may be overstated (SP).		14 19 26	45	
22.5		12			Moist, brown, gravelly, fine to coarse SAND, trace to some silt (SP/SP-SM).				
		13			Moist, brown, fine to medium SAND, some gravel, trace silt (SP).				
25		14			Slightly moist, brown to gray, gravelly, fine to medium SAND, trace silt; broken gravel in spoon; blow counts may be overstated (SP).		8 22 24	46	
					No groundwater encountered.				
27.5									
30									
32.5									
35									
37.5									

8/24/2022

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Exploration Boring — EB-5

Sequim Branch Library Expansion and Renovation — Sheet: 1 of 2

Sequim, WA	Start Date: 7/27/22	Logged By: BCY
20220259E001	Ending Date: 7/27/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 160
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
0		1			**Asphalt - 4 inches** **Crushed Aggregate - 2 inches** **Fill** Moist, brown to dark brown with minor oxidation staining to orange, fine sandy, GRAVEL (≈1 inch in diameter) , trace to some silt (GP/GP-GM).		9 13 34	47	
2.5		2			Moist, brown, fine sandy, GRAVEL (<4 inches in diameter), some silt (GP-GM).				
		3			Dry, tan to gray, silty, gravelly, fine SAND; angular gravel: partially cemented? (SM).			38	
5		4			**Alluvium** Slightly moist, gray mixed with brown, fine to medium sandy, GRAVEL, trace to some silt; broken gravel in spoon; blow counts may be overstated (GP).		1 12 26		
7.5		5			Moist, brown, gravelly (<2 inches in diameter), fine SAND, trace silt (SP).				
		6			Slightly moist, tan to brown, gravelly (>1.5 inches in diameter), fine SAND, some silt (SP-SM).				
10		7			Slightly moist, brownish gray, very sandy, GRAVEL, trace to some silt; broken gravel in spoon; blow counts over stated (GP-GM).		8 43 50/6"	50/6"	
12.5		8			Slightly moist to moist, brown, gravelly, fine to medium SAND, trace to some silt; interbed (≈6 inches thick) of fine sand, some gravel, trace silt (SP/SP-SM).				
15		9/ 10			Moist, brown, fine to medium SAND, some gravel, trace silt; no SPT recovery; on rock; sample from sonic core(SP).		50/4"	50/4"	
17.5		11			Moist, brown, fine to medium SAND, some gravel, trace to some silt; layers (4 inches thick) of slightly moist, gray to tan, silty, fine sand, some gravel (SP/SP-SM).				

8/24/2022

20220259E001

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Exploration Boring EB-5

Sequim Branch Library Expansion and Renovation — Sheet: 2 of 2

Sequim, WA	Start Date: 7/27/22	Logged By: BCY
20220259E001	Ending Date: 7/27/22	Approved By: CMM

Driller/Equipment: Holt/Sonic Drill
Hammer Weight/Drop: 140#/30
Hole Diameter (in): 6
Groundwater Depth ATD (ft): N/A

Total Depth (ft): 26.5
Ground Surface Elevation (ft): 160
Datum: NAVD88
Groundwater Depth Post Drilling (ft) (Date): N/A ()

Depth (ft)	Sample Type	Sample	% Recovery	Graphic Symbol	Description	Water Level	Blows/6"	Blows/Foot (10 20 30 40 50+)	Other Tests
20		12			Moist, brown, fine sandy, GRAVEL, trace silt; poor recovery; broken gravel in spoon; blow counts overstated (GP).		32 50/3"	50/3"	
		13			Moist, brown, fine to medium sandy, GRAVEL (4 inches in diameter), trace silt (GP).				
22.5		14			Moist to slightly moist, gravelly, fine to medium SAND, some silt; layers (up to 6 inches thick) of dry, tan, silty, fine sand, some gravel (SP-SM).				
25		15			Slightly moist with dry layers, brown, gravelly, fine to medium SAND, trace to some silt; broken gravel in spoon; blow counts overstated (SP/SP-SM) .		11 50/6"	50/6"	
					No groundwater encountered.				
27.5									
30									
32.5									
35									
37.5									

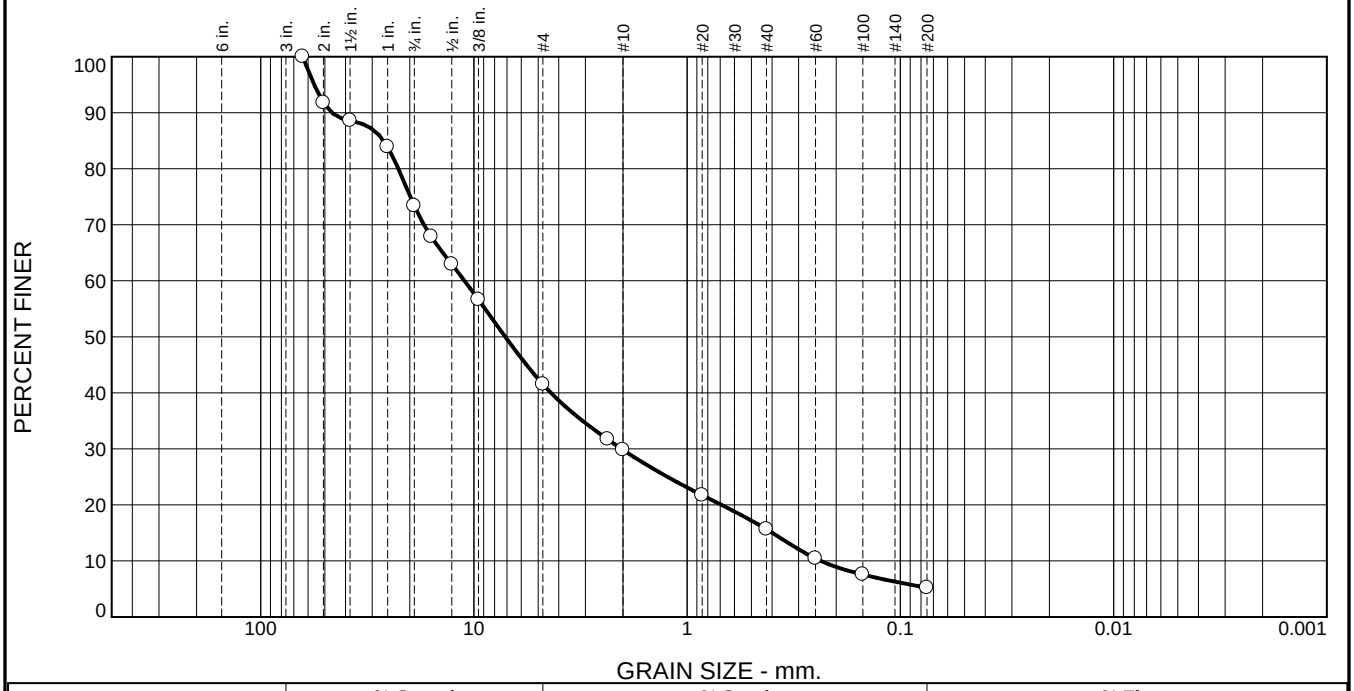
8/24/2022

20220259E001

APPENDIX B

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.6	31.9	11.7	14.1	10.5	5.2	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2.5"	100.0		
2"	91.8		
1.5"	88.6		
1"	83.9		
3/4"	73.4		
5/8"	67.9		
1/2"	62.9		
3/8"	56.6		
#4	41.5		
#8	31.7		
#10	29.8		
#20	21.7		
#40	15.7		
#60	10.4		
#100	7.6		
#200	5.2		

* (no specification provided)

Material Description

very sandy GRAVEL, some silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GW-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 46.3634 D_{85}= 26.5187 D_{60}= 11.0754
D_{50}= 7.1300 D_{30}= 2.0331 D_{15}= 0.3985
D_{10}= 0.2364 C_u= 46.84 C_c= 1.58

Remarks

Date Received: 8/3/2022 **Date Tested:** 8/5/2022

Tested By: CI

Checked By: BCY/BD

Title:

Location: Onsite
Sample Number: EB-3 **Depth:** 2'

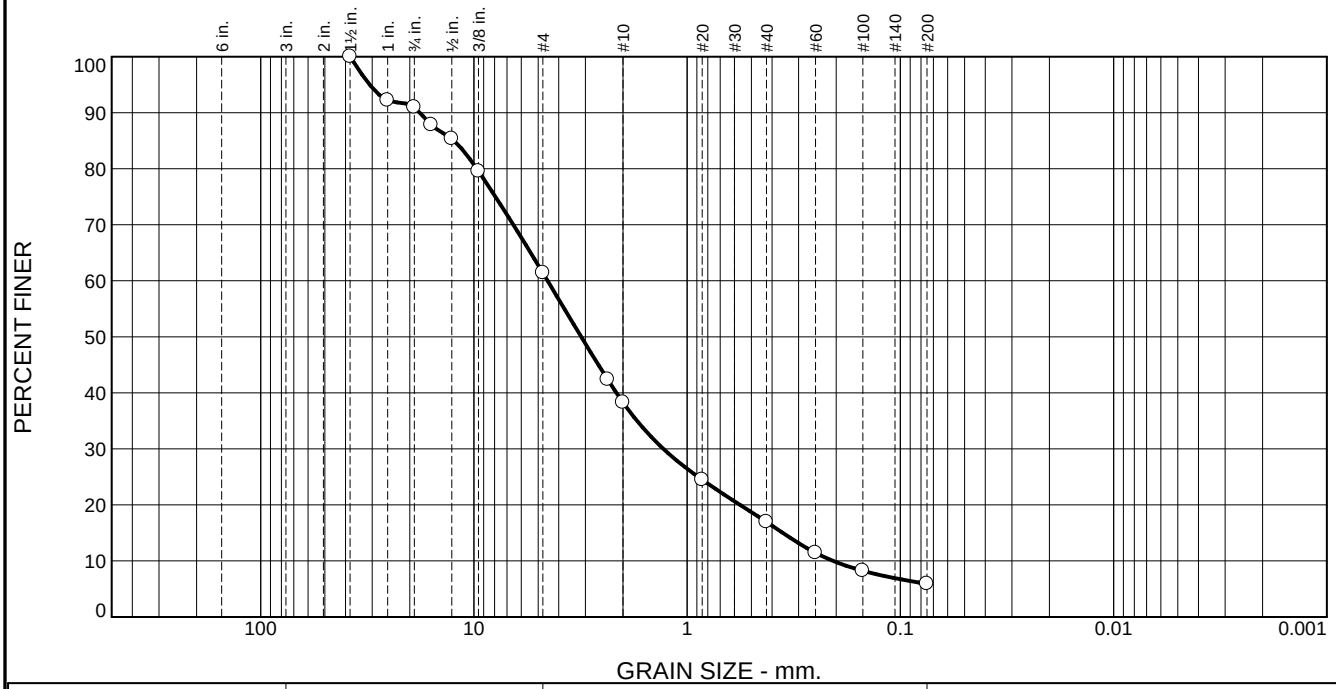
Date Sampled: 7/26/2022

associated earth sciences incorporated

Client: North Olympic Library System
Project: Sequim Branch Library Expansion and Renovation

Project No: 20220259 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.1	29.5	23.1	21.3	11.1	5.9	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1"	92.2		
3/4"	90.9		
5/8"	87.8		
1/2"	85.3		
3/8"	79.5		
#4	61.4		
#8	42.4		
#10	38.3		
#20	24.5		
#40	17.0		
#60	11.4		
#100	8.2		
#200	5.9		

* (no specification provided)

Material Description

very gravelly SAND, some silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 17.9069 D_{85}= 12.3969 D_{60}= 4.5143
D_{50}= 3.1400 D_{30}= 1.2934 D_{15}= 0.3560
D_{10}= 0.2069 C_u= 21.81 C_c= 1.79

Remarks

Date Received: 8/3/2022 **Date Tested:** 8/5/2022

Tested By: CI

Checked By: BCY/BD

Title:

Location: Onsite
Sample Number: EB-3 **Depth:** 7'

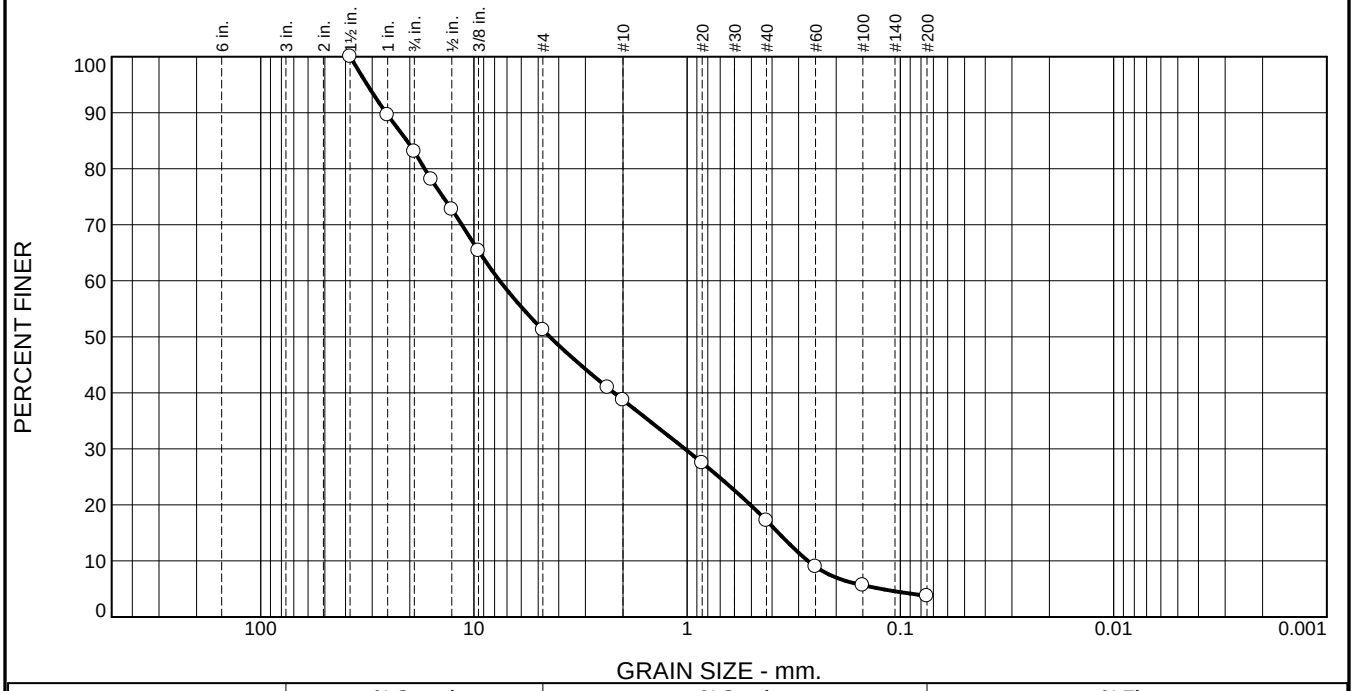
Date Sampled: 7/26/2022

associated earth sciences incorporated

Client: North Olympic Library System
Project: Sequim Branch Library Expansion and Renovation

Project No: 20220259 E001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.9	31.9	12.5	21.5	13.5	3.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1"	89.6		
3/4"	83.1		
5/8"	78.1		
1/2"	72.7		
3/8"	65.4		
#4	51.2		
#8	40.9		
#10	38.7		
#20	27.5		
#40	17.2		
#60	9.0		
#100	5.7		
#200	3.7		

* (no specification provided)

Material Description

very sandy GRAVEL, trace silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GP **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 25.8587 D_{85}= 20.6272 D_{60}= 7.5705
D_{50}= 4.4092 D_{30}= 1.0253 D_{15}= 0.3730
D_{10}= 0.2715 C_u= 27.88 C_c= 0.51

Remarks

Date Received: 8/3/2022 **Date Tested:** 8/5/2022

Tested By: CI

Checked By: BCY/BD

Title:

Location: Onsite
Sample Number: EB-3 **Depth:** 22'

Date Sampled: 7/26/2022

associated earth sciences incorporated

Client: North Olympic Library System
Project: Sequim Branch Library Expansion and Renovation

Project No: 20220259 E001 **Figure**

December 6, 2022
Project No. 20220259E001

North Olympic Library System
2210 South Peabody Street
Port Angeles, Washington 98362

Attention: Brian Phillips

Subject: Results of Pavement Coring and Recommendations for Pavement Resurfacing
Sequim Branch Library Expansion and Renovation
630 North Sequim Avenue
Sequim, Washington

Reference: "Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report, Sequim Branch Library Expansion and Renovation," Associated Earth Sciences, Inc., dated August 25, 2022, Project No. 20220259E001

Dear Mr. Phillips:

Associated Earth Sciences, Inc. (AESI) is pleased to present this letter providing the results of our pavement coring and resurfacing recommendations for the proposed parking lot improvements associated with the Sequim Branch Library Expansion and Renovation project in Sequim, Washington. The pavement coring work was performed in accordance with our proposal dated November 2, 2022 and is supplementary to our earlier work on the project, which included subsurface explorations on the property and preparing the August 2022 geotechnical engineering report referenced above.

PROJECT DESCRIPTION

The project site is the existing Sequim Branch Library, located at 630 North Sequim Avenue in Sequim, Washington. We understand the library was constructed in 1983. The existing building is approximately 6,000 square feet in area and constructed on a 620-foot by 135-foot building lot. We understand that the library building is planned to be expanded to the south and east with additional parking to the northeast and parking lot improvements to the west. Based on our email correspondence with the design team and review of available construction plans from 1982, it appears that the existing pavements were planned to be constructed with a section comprised of 2 inches of asphalt underlain by 4 inches of crushed rock base course. However, our August explorations completed in the southern drive lane and at the southeast corner of the library building indicated the existing pavements are comprised of 4 inches of asphalt underlain by 2 inches of crushed rock.

The purpose of this pavement study was to confirm the condition and thicknesses of the existing pavement sections for both light-duty parking stalls and heavy-duty drive lanes within the western parking lot and to formulate recommendations for resurfacing options. The results of our pavement coring and resurfacing recommendations are provided below.

PAVEMENT CORING

We performed four pavement cores (C-1 through C-4) in the main parking lot to the west of the library building. Pavement cores C-1 and C-3 were located within the heavy-duty drive lanes and cores C-2 and C-4 were located within the light-duty parking stalls. The approximate core locations are shown on Figure 1 along with our previous site explorations completed to date. The pavement cores were completed by advancing a 10-inch-diameter steel core barrel through the existing pavement section, measuring the observed layer thicknesses, and advancing shallow hand excavations into the existing subgrade soils to classify soil type. Upon completion, the pavement cores were patched with quickset concrete by our paving subcontractor, Olympic Concrete Cutting. A summary of our pavement coring observations is provided in Table 1 below.

Table 1
Summary of Pavement Coring Observations

Core No.	Observed Pavement Section[1]	Thickness (inches)
C-1	Asphalt	2
	Crushed Rock Base Course	3
	Subgrade = medium dense, silty fine sand, some gravel (SM)[2]	--
C-2	Asphalt	2
	Crushed Rock Base Course	3.5
	Subgrade = medium dense, silty fine sand, some gravel (SM)[2]	--
C-3	Asphalt	2
	Crushed Rock Base Course	1.5
	Subgrade = medium dense, silty fine sand, some gravel (SM)[2]	--
C-4	Asphalt	2
	Crushed Rock Base Course	4
	Subgrade = medium dense, silty fine sand, some gravel (SM)[2]	--

1. Listed in top-down order (from pavement surface to subgrade level).
2. Soil classification based on the Unified Soil Classification System (USCS).

SUMMARY OF PAVEMENT DISTRESSES

As part of this study, we also evaluated the condition of the existing asphalt pavements within the western parking lot area. Evidence of pavement fatigue was observed throughout most of the paved surfaces. Moderate to severe alligator cracking was observed in the entrance and exit lanes. The drive lanes exhibited a combination of moderate block cracking and occasional alligator cracking. The light-duty parking stalls were generally in better condition than the drive lanes and contained occasional block cracking with minor alligator cracking. The pavement distresses observed are provided in Photos 1 through 4 below.



Photo 1: Moderate to severe alligator cracking along exit drive lane; facing west.



Photo 2: Moderate block cracking and occasional alligator cracking along drive lane near book dropoff; facing northeast.



Photo 3: Moderate block cracking and isolated alligator cracking along exit drive lane; facing north.



Photo 4: Occasional block cracking and minor alligator cracking within center parking stalls; facing west.

RECOMMENDATIONS FOR PAVEMENT RESURFACING

Our pavement evaluation and resurfacing recommendations are based on our site reconnaissance, the subsurface data obtained from our coring explorations, our discussions with the design team, and our experience with similar projects and traffic loadings. Our recommendations for light-duty parking stalls, heavy-duty drive lanes, and subgrade preparation are provided below. Our evaluation considered both a "grind and overlay" and a full-depth replacement approach. We concluded that a grind and overlay approach was not practical and likely not feasible considering the prolific cracking and distress noted above.

Light-Duty Parking Stalls

Pavement cores C-2 and C-4 were performed within the light-duty parking stall areas. The cores indicated the existing pavement section consists of about 2 inches of asphalt over 3 to 4 inches of crushed rock base course. Beneath the base course layer, the shallow subgrade soils were similar at each pavement core location and generally consisted of medium dense silty sand with some gravel, interpreted to be old site development fill material.

Given the relatively thin pavement sections encountered and the observed distresses, we recommend full-depth reconstruction for the new parking stall areas. We recommend a

full-depth pavement section consisting of 3 inches of ½-inch Hot Mix Asphalt (HMA) over 4 inches of crushed surfacing base course (CSBC). All paving materials should meet the gradation criteria contained in the current Washington State Department of Transportation (WSDOT) Standard Specifications.

Since pavement cores C-2 and C-4 encountered about 4 inches of crushed rock below the existing asphalt section, an alternative resurfacing option for the light-duty parking stall areas could include the removal of the existing asphalt section and the re-compaction of the crushed rock base course layer. The proof-rolled subgrade would then be ready for a new asphalt pavement section. This option would require that the final pavement grades be raised by 1 inch to accommodate a 3-inch-thick asphalt section.

Heavy-Duty Drive Lanes

Pavement cores C-1 and C-3 were performed within the heavy-duty drive lane areas. The cores indicated the existing pavement section consists of about 2 inches of asphalt over a crushed rock base course, ranging from about 1.5 to 3 inches in thickness. Beneath the base course layer, the shallow subgrade soils were similar at each core location and generally consisted of medium dense silty sand with some gravel, interpreted to be old site development fill material.

Given the relatively thin pavement sections encountered and the observed distresses (moderate to severe alligator cracking and block cracking), we recommend full-depth reconstruction for the heavy-duty drive lanes. We recommend a full-depth pavement section consisting of 4 inches of ½-inch HMA over 6 inches of CSBC.

Subgrade Preparation

All new pavement areas should be prepared in accordance with the “Site Preparation” section of our referenced geotechnical report. Any soft or yielding areas should be overexcavated to provide a suitable subgrade and backfilled with structural fill.

CLOSURE

We appreciate the opportunity to be of continued service to you on this project. Should you have any questions regarding this letter or other geotechnical aspects of the project, please call us at your earliest convenience.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

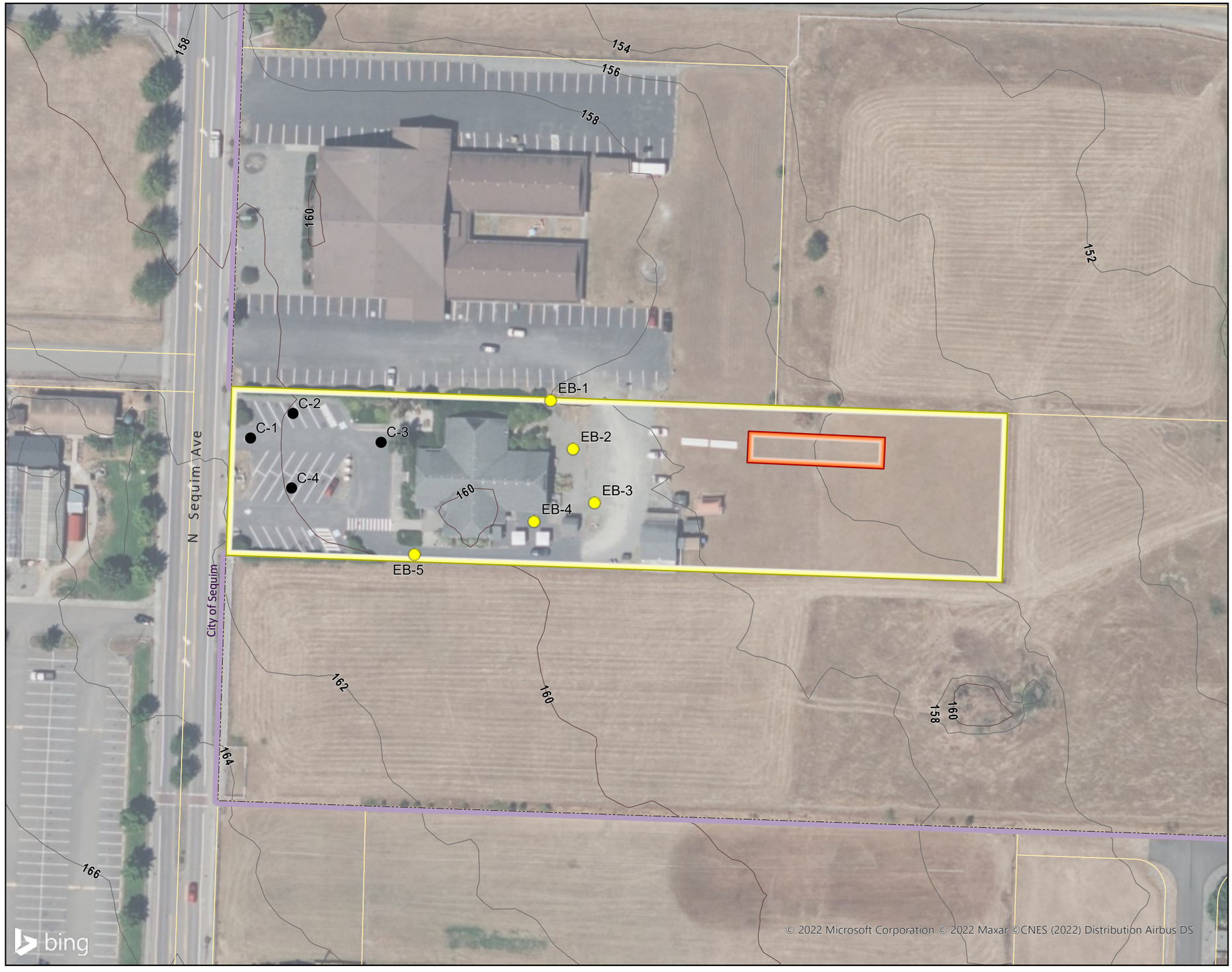


G. Bradford Drew, P.E.
Senior Engineer

Kurt D. Merriman, P.E.
Senior Principal Engineer

Attachment: Figure 1 - Existing Site and Exploration Plan

Note: Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



LEGEND

- SITE
- EXPLORATION BORING
- CORE
- PROPOSED BIO INFILTRATION CELL
- PARCEL
- CITY BOUNDARY
- CONTOUR 10 FT
- CONTOUR 2 FT

DATA SOURCES / REFERENCES:
USGS: OLYMPIC PENINSULA, WASHINGTON 3DEP LIDAR - AREA 1, FLOWN 9/17 - 4/19, CONTOURS FROM LIDAR
CLALLAM CO: PARCELS, STREETS, ZONING 7/22
AERIAL: BING IMAGERY 7/20

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE



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FEET

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associated earth sciences incorporated

EXISTING SITE AND EXPLORATION PLAN

SEQUIM BRANCH LIBRARY EXPANSION & RENOVATION
SEQUIM, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20220259E001	11/22	2

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From: Bradford Drew <bdrew@aesgeo.com>
Sent: Monday, October 10, 2022 4:27 PM
To: Marc J. Servizi <MarcS@lpdengineering.com>
Cc: Laurie Pfarr <LaurieP@lpdengineering.com>; Andrew Wong <AndrewW@lpdengineering.com>; Adam Lyons <adaml@iesinnovates.com>; Pia Westen <piaw@shksarchitects.com>; Jordan Inman <jordani@shksarchitects.com>; Jennifer Saltonstall <Jsaltonstall@aesgeo.com>; Kurt Merriman <kmerriman@aesgeo.com>; Adam Hutschreider <adamh@shksarchitects.com>; bphillips@nols.org; Noah Glaude <NGlaude@nols.org>
Subject: RE: Sequim Library - Stormwater Infiltration request.

Hi Marc,

Based on grain size analysis of a soil sample obtained from boring EB-3 at a depth of about 7 feet below existing grade (corresponding to native alluvium – very gravelly SAND, some silt), we recommend using a preliminary design infiltration rate of 10 inches per hour for preliminary sizing purposes. It should be noted that EB-3 is located about 130 feet west of the proposed bio-infiltration facility (see attached exploration plan).

We recommend additional explorations (test pits and laboratory grain size analyses) within the footprint of the facility to confirm the design infiltration rate. It may be possible to obtain a higher infiltration rate by conducting a pilot infiltration test as the reduction factors are less when compared to the grain size analysis method.

Thanks,

G. Bradford Drew, P.E. | Senior Engineer

AESI

Celebrating 40 years of excellent service

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